The Trade Review and Western Machinist.

FIFTEENTH YEAR.

The only strictly Manufacturing, Industrial and Scientific Paper published in Ohio.

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WILSON M. DAY, - - - - - - - Editor.
FRANK N. CARTER, - - - Business Manager.

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A NEW START IN NEW HANDS.

With the present issue the Cleveland TRADE REVIEW AND WESTERN MACHINIST passes into new hands. The purchasers are Messrs. Wilson M. Day, late associate editor of the Akron *Beacon*, and a former night editor of the Cleveland *Leader*, and Frank N. Carter, successively in charge of the city circulation, the books, and the advertising department of the *Beacon*. Their interest in and control of the REVIEW is absolute, and they have by this move become permanently identified with Cleveland business circles. Mr. Day assumes the editorial control, and Mr. Carter the business management. This much by way of explanation and introduction. A word or two only at this time as to the policy of the new management: The REVIEW, now in its fifteenth year, has become the established industrial authority of a large and prosperous section. It has a field not contested by any other paper. Its patronage is comfortable and growing. Its relations with the business men and manufacturers of Ohio and adjoining States are harmonious and mutually beneficial. It has an abiding faith in the substantial future of Cleveland and the teeming territory in a greater or lesser degree tributary to it. Whatever will promote these several interests it will be the endeavor of the new management sedulously to cultivate. It will find in the field before it ample opportunity for enterprise in many directions, and it will not be for want of hard work and liberal expenditure if it fails to meet the expectations of its friends. While practical mechanics and applied science will be given due attention, the leading purpose of the REVIEW will be to serve, above all, as a reflex of the combined push and energy of the business and industrial world, especially of that portion coming within its more immediate scope and influence. With this as its goal, the new management extends a hearty greeting to its constituency, in the hope that the mutual good-will between paper and patrons may improve upon acquaintance, and that the REVIEW may win success by deserving it.

MECHANICAL FORESIGHT.

An eminent English philosopher has lately treated, in an article widely published, and under the heading of "Lucidity," the question as to which of the European nations thinks most clearly, he giving the palm, rightly or wrongly, to the French. If there is a people, however, which possesses this mental quality in an eminent degree it is Americans, and this *par excellence* in the mechanical field. If clearness of thought means anything, it is the grasping of principles,—those true guides to sound advance, and so applying them as to get the best results,—in short, seeing the end from the beginning. The possession of lucidity involves a whole group of mental qualities, such as ready perception of essential elements, full comprehension of their relative influence and value, and good practical judgment. In the progress which this country has made in mechanical invention—and invention has to do with adaptation as well as origination,—we find a process of simplification of former devices going on, a throwing off of cumbersome and complicated parts or details, in short more clearness of purpose and directness of aim. Other nations run, so far as machinery is concerned, too much in the old grooves; traditional influences and conventional styles are strong upon them, all impediments to clear reasoning in grasping principles and tracing them to possible results. The freedom from the conventionalities of European countries, which exists here, is favorable to mechanical development. An American accepts nothing as perfect. What is accomplished is regarded as a stepping stone to something higher or superior. All this comes from mental clearness, and, to adopt the word with with which we started, from lucidity. Some of the greatest inventions of former times were reached by chance, or happy accidents; now the inventive art proceeds mostly by scientific investigation, which, accepting all past experience in the same line, refuses to be absolutely guided by it, and is watchful for the opportunity of some new departure. It is astonishing to find how long the dicta of theorists, philosophers, as they were reputed, on the properties and laws of matter, held for generations inventive genius in chains. The world may be said to have teemed with mechanical heresies. A noticeable illustration presents itself in respect to electricity. It had been laid down by the savants of Europe that the electric current could never be put to account in the way of transmission over any great length of wire on the alleged and really plausible ground that whatever the strength of the actuating current at the start, it weakened in the ratio of distance. The fact was true, but the inference wrong. When the great Atlantic cable was laid, enormous batteries, which eventually ruptured it, were employed with the idea of propelling the current from one extremity to the other, whereas now, with clearer views of electric action and transmission, a slight battery is found to suffice for working the longest cables, it being only necessary for signaling to disturb the equilibrium of the static charge in cable or wire. With that most subtle element—electricity, American genius is in the van, personified in an EDISON with his transcendant mechanical foresight, for it is by a knowledge of mechanics combined with the science of chemistry in dealing appreciatively with the facts brought to light by his own experiments and former researches,—and seizing and applying the underlying principles, marshaling phenomena into order and rendering them coherent, that he has accomplished marvels of development. In the metallurgical and other industries American mechanicians have introduced improvements which confirm the national claim to superior mechanical foresight.

THE FUTURE OF NEW YORK CANALS.

It is something new in the history of States to have an artificial water-way made free. Yet this is what has come to pass in New York, the people to whom the free canal amendments were submitted having ratified them. The commercial bodies of New York have been prime movers in the matter, the motive being to benefit New York as the commercial emporium of the country, by lessening the advantages of other ports nearer to the grain producing regions. The votes last winter in the Assembly and Senate, by which the free canal amendments were rejected, came from men representing counties situated off the line of the canals, but the decision of the people, on appeal, renders the amendment an organic law of the State. This action is to be taken in the light of a gift to the great grain producing regions, lessening materially the cost of transport from the interior to the seaboard. A tax is to levied annually to pay the expenses of the superintendence and repairs of the canals. A tax is also to be levied to pay the interest and extinguish the principal of the canal debt as the same shall become due. The Legislature is authorized at its discretion to impose a tax, beginning with the fiscal year dating from October 1, 1883, which will raise a sum sufficient, with the accumulations of the canal sinking fund, to pay in full both the principal and interest of the debt. The question as to how far this freedom from canal tolls will divert traffic from the railways, is one which the future will best solve. The rhetorical exaggerations of the advocates of free canals will, of course, not be realized, but we may safely predicate a large accession of business, possibly to an extent that may modify railway rates. Water routes, whether by river, canal or lake, have always exerted an appreciable influence on railway rates of freight. With abundant harvests, however, and grain at a price to create a large demand in Europe, the canal business would probably reach something like former proportions, and, as a concomitant, barge building in Cleveland and elsewhere, would receive an important stimulus. The Erie canal, to serve its proper purpose, needs to be enlarged, as we pointed out in a previous article, but this would be necessarily a costly step, and, probably, will not be undertaken until the results of the free policy are developed.

STEEL IN STRUCTURES.

In large structures steel is gaining ground with great rapidity on account of the ease and certainty with which its chemical components may be regulated, thus insuring the easy production of any quality of material that may be desired. As soon as the requirements of the engineers are known, the steel maker, after a few trials, can meet them, if they are within the limits of reason, and this accomplished he is able to reproduce the sample in any needed quantity or size. The uncertainty of skilled manual labor, the dangers from bad welds, bad puddling, or irregular stock, never enter into his calculations. The steel may be kept in a state of fusion for a length of time that will enable the operator, by well known tests, to determine very closely its composition and make such changes as may be necessary whilst it is in fusion, thus securing practical uniformity in various pieces as well as conformity to specifications. Such steel may be made to run by gravity to any part within reach of the cranes for handling the mass, and it can be put into shape without a large number of skilled hands. Ease of production, economy of labor, and certainty of quality are all greatly in favor of cast steel over wrought iron, the ratio in favor of steel increasing much faster than the weight. Steel, when cast, is ordinarily poured into iron moulds, and the fractured ingots, as stated in the work on "The Treatment of Steel," afford an unvarying record of the completeness or incompleteness of the fusion of the rate and temperature of the pouring, and of the chemical character of the steel, especially as it relates to carbon.

ON the subject of boiler explosions M. Treve, of France, has ventured on an explanation of one of the several operative causes which appears to be well worthy of attention, and this is that when a boiler has been kept for a considerable length of time with its fire banked up, the hot water is totally deprived of air, rendering an explosion probable from the raising of the heat. The best preventive course in such case is for engineers to run off a part of the water and admit fresh water which itself will be a vehicle of fresh air. The danger of explosion from the insufficiency of gaseous matter and consequent superheating can be wholly prevented by inserting zinc in the boiler, which establishes a battery between itself and the iron, with a continuous decomposition of water generating hydrogen gas, besides which the zinc soap, formed by the combination of the zinc oxide (oxygen of zinc), with the fatty acids present in the feed water, prevents the adhesion of saline matter to the sides and plates of the boiler.

THE REVIEW wants to get hold of and print every industrial item of any importance obtainable within the territory through which it circulates. It will aim at *freshness*, and it asks the co-operation of its patrons to this end.

SEVERAL improvements in the REVIEW are under consideration, which will make themselves apparent from time to time.

REVIEWS.

THE WESTMINSTER REVIEW for October. Republication. New York: Leonard Scott Publishing Co., 41 Barclay street.

The contents of this number are "River Polution," "Socialism," the poetry of Mrs. E. B. Browning; "France—the Chamber and the Ministry," "The Jubilee of the First Reform Act," "The British Association for the Amendment of Science," "Parliamentary Procedure" with able reviews of Contemporary Literature, and a closing article on "India and Our Colonial Empire."

DEMOREST'S MONTHLY MAGAZINE for December. New York: W. J. Demorest.

This number has a superb colored engraving entitled "Rose Time," and other page steel engravings. With stories, sketches and illustrations it constitutes an enjoyable Christmas number. The department, "Mirror of Fashion" is of the usual excellence.

THE LUMBERMAN'S HAND BOOK. New Edition. Enlarged and Illustrated. By W. B. Judson, Editor of *Northwestern Lumberman*. Chicago: Northwestern Lumberman.

The first portion of this work is explanatory of the systems of inspection adopted at the lumber centres. We wish that the nomenclature or grades which are adopted in Cleveland had, however, been furnished, regarding oursystem, as we do, as the best extant. Then comes an exposition of log measurement, aided by tables. From a bright, clear treatise on shingle manufacture we pass on to rural architecture into which lumber so largely enters. This section is enriched by illustrations, including even ground plans. A series of valuable, practical instructions, under the title of "Hints to Builders," are furnished. The work contains a particularly valuable and exhaustive article on mechanics' lien laws.

This handy book concludes with miscellaneous information applying to lumber, etc. A Ready Reckoner is among the useful contents. The work is admirably indexed. We may add that it is in small compass, is strongly bound, and that the typographical execution is all that could be desired.

THE change from sailing vessels to steamers has compelled the former to carry other and less desirable freights than grain. The fine American packet lines, once the pride of the merchant marine, have disappeared. Indeed, not a single American vessel loaded with grain has cleared from New York in nearly two years.

MANUFACTURERS.

TO MACHINISTS. MANUFACTURERS AND OTHERS.

THE publishers of THE TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinist and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

OHIO INDUSTRIES.

CLEVELAND.

THE Forest City Heating and Light Company, of Cleveland, has been incorporated. Capital, $1,000,000.

MR. BASTER, of the Cleveland Automatic Engine Works, has patents on a new automatic cut-off engine that runs high or low speed without changing governor or valve gear.

THE Buckeye Stove Co. are making a very handsome line of cooks under the name of the "Buckeye." They guarantee the smoothness of the castings and the perfection of the fittings.

THE Butman Furnace Co. are setting twenty boilers in Chicago, a battery of eight being for J. V. & B. C. Farwell, and seven for the Chicago Northwestern Horse Shoe Co., all with their patent setting.

THE Cleveland Machine Co. have a new building, 75x25, fitted to do all kinds of drop forging, and in addition to their regular line of box machinery will manufacture carriage hardware.

COX & PRENTISS, of the Cleveland Twist Drill Co., have added improved machinery which will increase their production of their special tools. Their circular states a change of prices to correspond with other manufacturers.

THE Holt Manufacturing Co., manufacturers of the Holt portable forge have increased their facilities for manufacturing. These forges are built of all sizes, wrought-iron frame, and are noiseless. Over 2,000 are now in use and giving good satisfaction.

THE Worswick Manufacturing Company, corner Merwin and Center streets, steam fitters, machinists and brass founders, are extremely busy in these two lines. Numerous orders are coming in for the Worswick Patent Radiator, a specialty of the Company. From the time these Radiators were introduced, the demand for them has been steadily enlarging. The Worswick Patent covers important improvements both in construction and adaptation. There is nothing within the range of gas and steam supplies which the Company do not furnish. The President of the Company is Mr. E. Lewis, and the Secretary and Treasurer Mr. John Prindle.

OHIO IN GENERAL.

OUR Galion correspondent writes: The Empire Organ Co., manufacturers of parlor and chapel reed organs, which was established in 1879, employs 20 hands. Their organs are of admirable construction and excellent workmanship. They anticipate an improved trade the coming season. ——Squier & Homer, engine manufacturers, who make specialties of McClinton's Star Feed Cutter, thresher engines and pony saw-mills, were estab lished in 1854 and employ 30 hands. The firm report trade very good the past season. The cutter is well worth examination. It is claimed that it has the only reliable stop-feed to be found on any machine. Their large double circular saw mill will cut from 8,000 to 12,000 feet of lumber per day. They furnish these with 30 feet carriage 60 feet track way; top saw from 30 to 36 inches, lower saw 56 inches lever, ratchet, head block,with friction feed, belt, lumber trucks and everything complete for $800. Their circular pony saw mill can be run with one of their thresher engines, and will cut from 2,500 to 3,500 feet of lumber per day. The frame is cast iron with steel mandrills, 28 feet carriage, 56 feet track-way, lever ratchet head blocks, with friction feed, 52 inch saw with 50 feet four-ply belt, lumber trucks, cant hooks, and everything complete for a first-class mill.——The Herbold Furniture Co., who were established in March last, employ 25 hands. Their principal sales are in Ohio, Pennsylvania and Western New York. Their trade is reported excellent.

OUR Salem correspondent writes: The Buckeye Engine Co., established in 1848, and manufacturing automatic and throttling engines, saw mills and shingling machines, is filling orders for Europe. They employ 200 men. Joel Sharp is president, Milton Davis, vice president; Thos. C. Boone, secretary and treasurer; Joel S. Bonsall superintendent, and Simon Sharp, assistant superintendent.——I. Woodruff & Sons, stove manufacturers, have done an increased business this year. They were established in 1846.——The Perry Stove Co., located near the Fort Wayne railroad depot, and which was organized in 1868, have a steadily developing trade; they employ upwards of 60 hands. ——The Salem Iron Works, the proprietors of which are Messrs. Sharp & Co., present a scene of busy activity. The demand has augmented for their side-valve engines, saw-mills, gearing and shafting. The firm was established in 1843.

MESSRS. SACKETT & WOOD, North Water street, Akron, manufacturers of oil cloths and waterproof goods, rick covers, harvester and wagon covers, etc., find their enterprise so far well rewarded by the increase of orders coming in, and which will shortly compel them to enlarge their premises. Wholesale dealers allow that their goods are the best in the market. The firm are the only manufacturers in their line in the West, which previously to their advent was supplied exclusively by makers in Pennsylvania and New York. Akron is reasonably proud of harboring this new industry. Both members of the firm are thoroughly versed in all the details of the manufacture and personally supervise operations. Among their productions are wagon covers, horse covers, buggy aprons, wash aprons, hay and grain caps, coats and leggins.

THE increase in the capital stock of Whitman & Barnes Manufacturing Co., of Akron, is rendered necessary by reason of large extensions and improvements at their several factories. They have built an entire new shop, fully equipped with new tools, at St. Catherines, Ont., for handling their Canada business. They have made large extensions to their works at Syracuse, N. Y., and have doubled the capacity of their Akron and Canton shops.

THE Licking Rolling Mill Company, of Cincinnati, are stated to have a controlling influence in the Maumee Rolling Mill, of Toledo, organized at that place during last August, with $500,000 capital.

DURING the past fortnight a large amount of Lake Superior and Champlain ores has been shipped into the Mahoning Valley to supply the many furnaces and rolling mills.

THE new frame building of the Nail City Glass Works, of Bridgeport, who were recently burned out, is about completed, and the work has been begun on the factory building.

Two of the furnaces of the Siemens-Marten steel mill of the Cleveland Rolling Mill Company have shut down, owing to the lightness of the railroad demand for new rails.

ANDREWS BROS. & Co., proprietors of the rolling mill at Haselton, recently removed from Niles, propose to introduce hot polished shafting among their products.

THE Rivet Co., Cuyahoga Falls, is putting in new machinery to increase the capacity for work if necessary and to do away as much as possible with night work.

BROWN, BONNELL & Co., of Youngstown, are changing the old water balance used at their Falcon Furnace, to a steam hoist.

BOTH furnaces of the Cherry Valley Iron Co., at Leetonia, are now out of blast and being repaired.

ADDITIONAL industries are to be located in Struthers that will add to the commercial importance of the village.

AT the mills of the Mahoning Valley Iron Co., Youngstown, all departments are on double turn.

THE average daily product of the nail factory at Brown, Bonnell & Co.'s works is 60,000 pounds.

THE Hot Polished Shafting Co., located at Haselton, has commenced manufacturing.

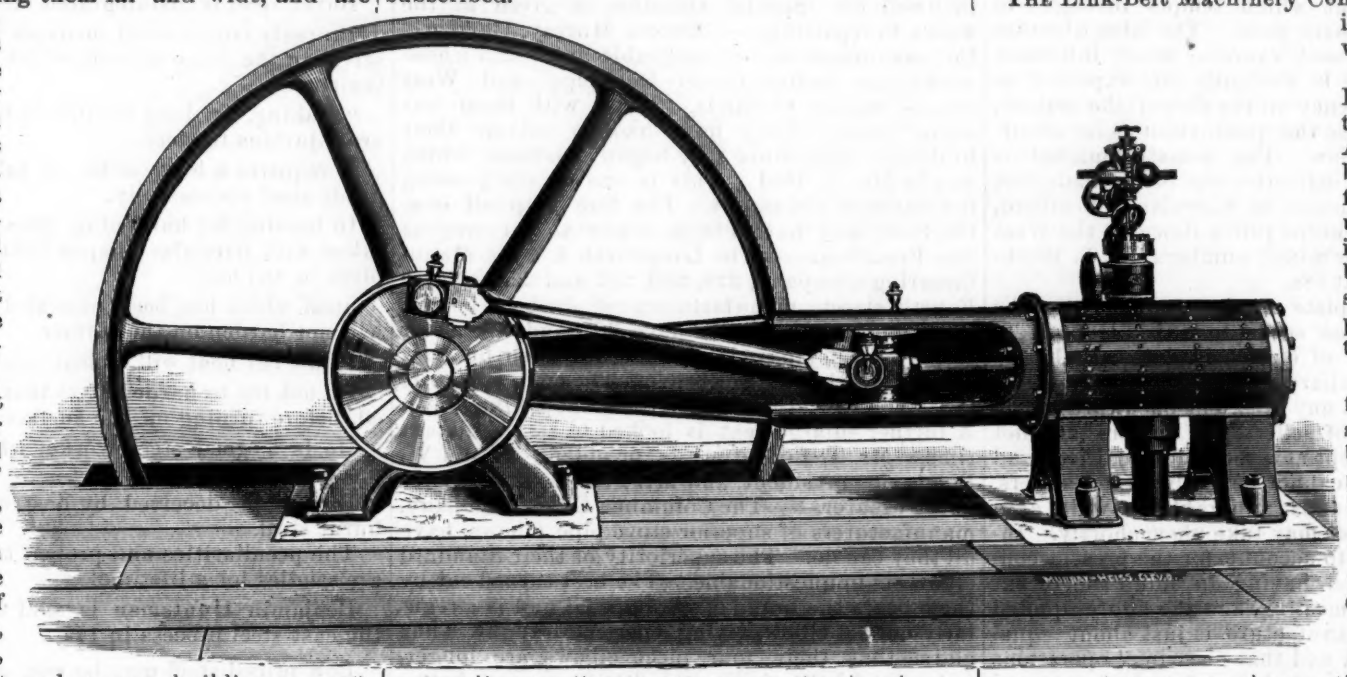
THE Toledo Car Wheel and Foundry Company have completed their new buildings.

THE coal mines in Liberty township are producing 1,400 tons of coal per day.

WALKER'S chair factory, Bellefontaine, is doing a good business.

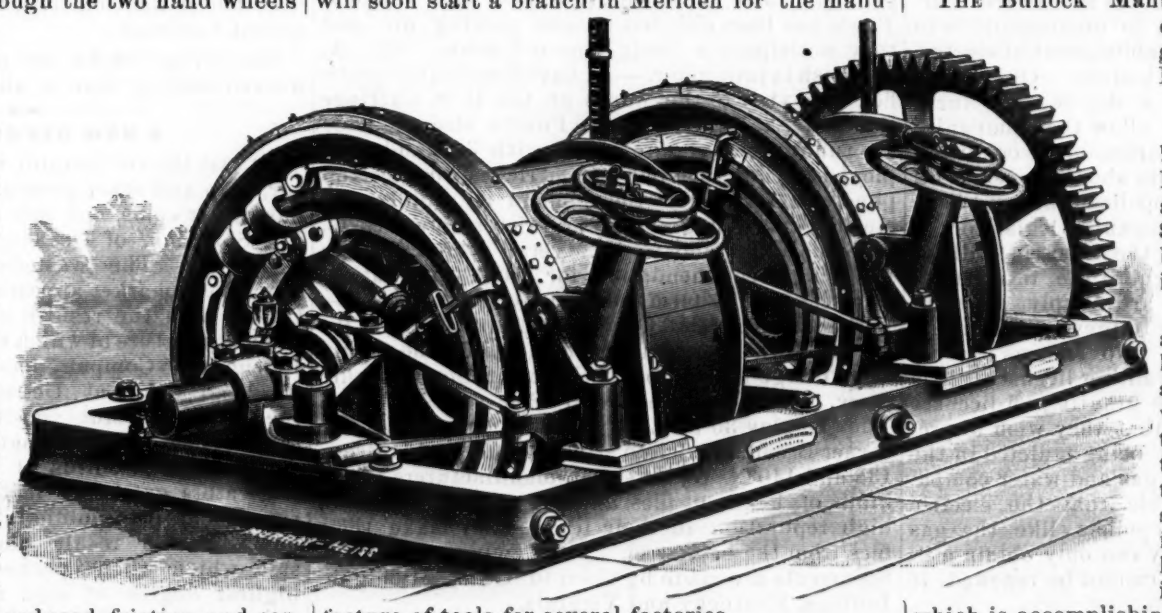
MORE AKRON MACHINERY.

The accompanying cut of an engine, made by the Webster, Camp & Lane Machine Co., of Akron, O., represents one of their Standard engines. The valve is a balanced, double ported slide valve which moves very easily and gives the best results attainable without a variable or automatic cut-off. The bed-plate and cross head are of the Corliss style. The best of steel, hammered iron and hard brass are used in their construction, and all nuts subject to wear are case hardened. They are trimmed throughout with the best glass brass-mounted oil cups and fitted with Waters' patent governor. The firm are sending them far and wide, and are gaining an enviable reputation as first-class engine builders. They also build, when desired, automatic cut-off engines. The firm have a full line of flour-mill patterns, and have furnished many of our best mills with entire outfit of machinery.



The second cut is of one of their patent Standard "Band Friction" Hoisting Drums, of which they have over 100 now in operation in the various mines of Lake Superior, Pennsylvania, Ohio and the West, and are now building an outfit for a copper mine in Montana.

The inner, or driving band, is made to revolve around a flange on the drum head, being attached at each end to arms carried by a driving disk which is keyed fast to shaft. One of these arms is fixed, while the other forms a lever to tighten the band, being connected by simple mechanism with the large hand wheel. Although the two hand wheels may be used—each independent of the other—they are usually locked together by a novel differential device, so that the operator has only to handle one, as one band automatically tightens as the other becomes slack. The drum is started gradually without the least shock or jar, thus being easy on foundations, machinery, sheaves, and cages or car, as well as the rope. The load may be slowed near the top, and thus stopped at the exact point without jar. The advantage of this method of applying the power upon the periphery of the drum is in reduced friction, and consequent saving of power, there being simply the friction of two journals of the drum shaft.



INDUSTRIES IN GENERAL.

PENNSYLVANIA.

THE American Iron works, at Pittsburgh, are building an addition 240x70 feet and 22 feet high. When completed the establishment will be the largest machine shop in the country.

HUBBARD, BAKEWELL & Co., Pittsburgh, have completed their new axe factory. The establishment consists of three buildings, the first 300x56 feet, the second, 348x46 feet and the third 228x50 feet.

A MANUFACTURING company has purchased ground at Canonsburg and will erect upon it a factory for the manufacture of sheet-iron kegs.

THE Crane Iron Co. is receiving a shipment of 30,000 tons of Lake Champlain ore.

THE new Vulcan Brass Works at South New Castle are approaching completion with facilities for making immense castings.

THE Lewis Foundry and Machine Company have begun an addition to their foundry. It will be 95x20 feet.

CONNECTICUT.

THE fibrous company of Hartford has organized with $50,000 capital stock to make polished tools, &c.

THE Yale Lock Company, Stamford, employ 500 hands.

THE $100,000 capital of the Automatic Safety Boiler and Engine Company, of Shelton, has been subscribed.

THE Farist & Windsor Company, Windsor Locks, produce about 1000 tons of low steel from Bessemer stock by the open-hearth process, yearly. The steel is used for machinery, table cutlery, agricultural machines, etc., and large lots of special cross section are made for particular manufactures, as the bicycle business.

THE Hendee Machine Company, of Torrington, will soon start a branch in Meriden for the manufacture of tools for several factories.

NEW YORK.

THE Syracuse Iron and Tube Company have started their works at East Syracuse, where they have a block of buildings, 500x300, and are the only boiler-tube manufacturers in the State. Machinery to double the capacity of the works, additional furnaces and a rolling mill will be added next season. The company have $250,000 capital, and when running full will employ 1,000 men.

THE Tewksbury Automatic Elevator Co., now have their elevators in working order at leading New York buildings.

EIGHT thousand tons of English iron are on the ocean en route for the Troy Bessemer Steel works.

MISSOURI.

THE St. Louis Wire Mill Company are running their works 22½ hours out of 24, and are turning out about two carloads of wire per day of 24 hours.

THE Brownell & Wight Car Company are building an addition to their factory, consisting of a building 30 feet in breadth by 140 feet in length, and three stories high, which they will use as a "body" shop. They have recently closed several contracts with companies at Cleveland, Ohio; Rock Island, Ill.; Aurora, Ill., and Minneapolis, Minn.

ILLINOIS.

A NEW reaping machine works is about to be established at Aurora by Messrs. Gronberg, Eggerman & Loser. The buildings are in course of erection.

CRANE BROS. Manufacturing Co., of Chicago, are doing a large business in the line of blast furnace hoists.

THE Link-Belt Machinery Company are moving into their new works.

THE Hoyt and Brothers Manufacturing Company of Aurora, have doubled their capacity for the manufacture of wood-working machinery by building a new shop, 150x60, and placing in it new tools.

A NEW building for the tile factory at Clinton will soon be erected, with capacity of six new kilns, or twelve miles of tile a week. The investment will be some $15,000.

THE Litchfield Car and Machine Company have begun the erection of an addition to their machine shops of 80x60 feet, to be used for storage purposes and a setting-up shop. The present setting-up shop will be occupied by new machinery.

THE Silver Star Works have been organized in Chicago with $300,000 capital to make crucible and open-hearth steel.

THE Bullock Manufacturing Company (rock drills and engines) expect to get into their new shops in December.

MICHIGAN.

A COMPANY to manufacture buttons, to be called the Ionia Button Co., has been formed at Ionia with a capital of $50,000. The factory will begin with 50 hands, increasing the force as needed.

THE Russell Car Wheel and Foundry Co., Detroit, have about completed the addition to their works, which was constructed to increase their capacity for turning out their lumber and logging trucks, of which they are the second largest manufacturers in the West. This company have just built another charging apparatus for cupolas, which is accomplishing remarkable results in this line.

THE Kalamazoo Wind-Mill Company have received an order for their wind-mills from Africa. This is "carrying the war into Africa" with a vengeance.

WISCONSIN.

JAMES HARRIS and D. P. Smith have purchased the barb wire works and machinery of Fish & Connell, at Joliet, and have organized the Janesville Barb Wire Company for the purpose of manufacturing barb wire in Janesville.

JANESVILLE parties have organized to establish a barb wire factory in that city.

QUITE a large addition is being built to the Marinette Iron Works foundry for weighing castings.

THE Racine Wagon and Carriage Co., Racine, are building a three-story brick addition to their works, 26x70 feet, designed for boiler rooms below and workshop above.

FOREIGN CORRESPONDENCE.

ENGLAND.

BIRMINGHAM, November 5.

The Glasgow market is depressed, and warrants close at 50s. 9½d. The adverse movement of prices in the face of favorable statistics is no doubt attributable to the fact that a large portion of the iron disposed of at the recent advance, passed out of the hands of *bona fide* holders and investors, into those dealers and brokers, who find it too heavy to hold at the present high rate of coinage (6 per cent. per annum). There will be no decided and substantial turn for the better, until either money becomes again cheaper, or till the price reaches a point which tempts investors to take up the article once more. The labor question does not for the present exercise much influence, and a serious strike is evidently not expected, as there is still a tendency on the part of the makers, gradually to increase the production as far as circumstances will allow. The hematite market is steady; very large deliveries are being made, but the abnormal production in Cleveland, Scotland, and other districts keeps prices down on the West coast. Warrants for mixed numbers f. o. b. Workington are quoted at 68s.

The tin and tin plate market is weaker. The demand for cake tins seems to have dropped to nothing. Makers of charcoal plate are barely well booked. In charcoal ternes, of the better brands, there is not any apparent backward movement on the part of sellers, but buyers are not willing to book except at a reduction in prices, and as makers of these cannot be badly off for orders, it will suit their hands admirably to wait, as a change for the better may take place shortly. Indeed, it is a puzzle to account for the present condition of the market, having in mind the recent report of the trade meeting, and the figures quoted to show that the manufacture is just about equal to the consumption, and that "bearing" operations had well nigh become extinct. No doubt the tin market has to some extent an influence upon buyers, whom, it would appear now, are apt to become scared at the sudden drop in the value, and for the time being hold aloof from business, watching the movement closely.

An unexpected impediment has presented itself to the development of the electric light in the way of city lighting. As your readers are aware, Parliament has given the power to municipalities to authorize or otherwise the establishment of electric light companies within their bounds One or two municipal bodies have, with a degree of coolness which is amusing, agreed to allow the companies to erect works in their boundaries, on the condition that they receive all the profits above 7½ per cent. Remembering the great monopolies that have been created in water and gas companies, legislators of all parties put in clauses in the Electric Bill for the purpose as they said, to guard the interests of the public. These clauses are simply powerful weapons in municipal bodies to prevent the general adoption of the new light. No reasons can be adduced in support of not granting licenses. The local authorities object to the granting of licenses to companies on the ground that they wish to prevent their constituents from being mulcted in the way they have been done by gas and water companies. It is utterly impossible that the electric companies can become monopolists like the gas and water companies. They can only obtain a license for seven years, which cannot be renewed if the authorities object.

A FLYING VISIT TO COLUMBUS, OHIO.

FROM OUR SPECIAL TRAVELING CORRESPONDENT.

COLUMBUS, November 14.

The industries of this enterprising city are in a thriving condition, and even in the brief period that has elapsed since my last visit I find the scale of production in many quarters increased.——The Vulcan Iron Works Company, corner Water and Chestnut streets, builders of improved forging tools, employ between 50 and 60 hands. Their prospects for the coming season they regard as excellent. They have been established a little over a year. They are about completing a large steam hammer for the Wheeling & Lake Erie Railroad Company's shops at Norwalk, O. Mr. W. S. Ide is president, and Mr. R. T. Clark manager.——The Lechner Manufacturing Company, manufacturers of the Lechner coal-cutting machine, also anti-friction detachable roller chain belting for transmitting power, report trade good. Their coal-cutting machines, which are more effective than any in the market, are being gradually introduced into the Ohio and Pennsylvania mines, whilst the convenience of their belting, allowing of ready adaptation, secured its ready adoption. Prospects are flattering.——The works of the celebrated saw manufacturer, Mr. James Ohlen, constitute a leading industrial establishment in this city of manufactories. Mr. Ohlen employs 60 hands, is running full time, and his only trouble is the difficulty of turning out goods fast enough to meet demand. There is an especial run for his champion chisel-tooth saw, attributable to the satisfaction given. The superiority of his saws of all kinds is too well known to dwell on. Special attention is given at the works to repairing.——Messrs. Murray, Hayden & Co., manufacturers of malleable iron, and whose works are located corner Randolph and West streets, employ 80 hands. Trade with them was never better. They have had to enlarge their buildings twice since they began business, which was in March, 1881. This is one of the growing industries of Columbus. The firm ship all over the East, and have a large trade as far west as San Francisco.——The Longstreth & Ayer Manufacturing Company, 228, 230, 232 and 234, North Fourth street, manufacturers of dashes, bodies, gears and carriage parts have 30 hands in their employ. They have lately moved to their fine new buildings, which are of brick. The main structure is 100x50 feet; the blacksmith's shop 40x90 feet. A further enlargement is looked to at no distant time. Mr. T. Longstreth is president, Mr. W. W. Bond, vice president, and Mr. F. C. Ayer secretary and treasurer.——The Columbus Elbow Company, manufacturers of superior stove pipe elbows, have all they can do. The superiority of their Standard elbows is unquestionable. The best turned out by them bears the brand of "Stamped," and is a regularly curved elbow, giving a perfect draught. They claim that their four piece elbows are longer, heavier, of better iron, and 100 per cent. better made than any of the same class on the market, and sell them as low as any. Quality and workmanship are unchallengeable. Every elbow is made perfectly true to size, and will fit.——The Capital City Machine Works, corner Spring and Water streets, manufacture the Standish Foot Power Hammer, hand lathes, punching presses, emery grinders, saw mandrills, pulleys and hangers. Trade has been dull but is now picking up, and they anticipate a lively season's trade. Mr. A. Standish is proprietor.——I have been highly gratified by a visit to the works of the U. S. Carriage Company, 251 to 261 South Fourth street. They are running nine hours a day, with 30 hands employed. They turn out fine carriages, buggies and phaetons, for which the demand is rapidly and steadily increasing. The proprietors are Messrs. A. Schlaechter and C. F. Myers. The carriages merit high commendation for what, in nautical phrase, one may term the beauty of their lines.——Borger Brothers & Co., proprietors of the City Boiler Works, have lately contracted for the supply of two large boilers for the Franklin County Infirmary. The firm have several other orders on hand. They employ 30 men. The office and works are corner Broad and Scioto streets.——Reynolds Bros., 138 and 140 N. Water street, manufacturers of all kinds of hand cut files and rasps, have gained a high reputation in their line. They make their files from the best steel. They employ 15 hands. Shipments are made by them to Ohio, Michigan, Indiana, Kentucky and Virginia.

STEEL SPARKS.

[From "Treatment of Steel."]

Over-heated steel tells its own story.

A high heat opens the grain of steel and prevents refining.

Cast steel properly hardened is invariably refined thereby.

The temper of steel is regulated by percentage of carbon.

The iron used in making steel determines its quality.

Consumers of steel should be guided by makers' advices.

Sulphur is an enemy to steel.

Good fuel is essential to best results in working steel.

Charcoal, from sound wood, is the king of fuels.

Avoid exposing hot steel to draughts of air.

Pure water is a good hardening medium.

Cherry red is a safe heat for steel.

Nick cold steel with cold chisels.

A good softening heat, for forging, can be safely used if proper precautions are observed.

The lead screws of lathes are often responsible for inaccuracies in the threads of taps.

Large pieces may often be protected in heating by being covered with a coating of dry clay.

No annealing is better than over-annealing.

Be sparing of the blast.

Time and care are necessary in the treatment of steel.

Burnt steel is disintegrated steel.

Properly constructed furnaces will pay for themselves in the value of tools which will be saved by their use.

"Soaking," or long continued heats, even if low, are injurious to steel.

It requires a high order of talent to treat high grade steel successfully.

In heating for hardening, great care should be taken with irregular shapes that no part of the piece be too hot.

Steel which has been annealed at a high heat will not harden on the surface.

A low red heat will anneal steel thoroughly.

Do not try to harden steel that has been annealed, before turning off the surface.

He is a good steel worker who never spoilt a piece of steel.

Do not be deceived by nostrums for restoring burnt steel.

The peculiarities and proper treatment of steel are studies for a lifetime.

Benjamin Huntsman is said to have invented the cast steel process in 1770.

Low priced steel may be very dear steel.

Steel is mercurial and delicately responsive to heat; its records appear in its own structure.

The last age: the age of steel.

Dirty, slack fires put dirty sulphurous oxides on steel.

The hardening heat varies with each temper of steel, and the only safe course is to harden at the lowest heat that, on trial, is found to give the required hardness.

Hardening cracks are more often the result of uneven heating than of any defect in steel.

A NEW REFRIGERATOR.

At last the refrigerator wanted for hotel, railroad car, ship and other general uses is forthcoming, or has rather come, and this from the fertile brain of Mr. Sheridan, of Detroit, a practical mechanic of that city. The wastefulness of the refrigerators on the market appears in a strong light contrasted with the results of his invention, and for the manufacture of which the Sheridan & McGough Refrigerator Company has been organized, having its head office at Detroit. As the result of the most careful positive and comparative tests, it is found that this apparatus consumes but two-thirds of the ice of the best refrigerators extant, a fact which must promptly recommend it to public favor. The question arises, how is this result accomplished? Ice and salt, which when packed together furnish the highest degree of cold attainable by ordinary means, are placed in the ice receptacle, alongside of which pass pipes admitting of a current of air which aids in maintaining the coldness, and so checking the tendency of the ice to dissolve. In applying the invention to railway cars, the salted ice is packed in angles formed between the roof and walls, the movement of the train causing the cooling air current to move with great rapidity. These receptacles have to be filled but twice in the journey between Chicago and New York, whereas the refrigerators now in use have to be renewed at least three times in that distance. Thus there is a saving of labor as well as money. Railway companies are quick to appreciate the importance of the least saving, and we may fairly anticipate that this new refrigerator will rapidly come into general use. The cornering of the ice market has led to extravagant rates in our great cities; and here is a ready and welcome means of lessening ice bills. We anticipate illustrating in a future number this valuable invention.

MECHANICAL RECEIPTS AND ITEMS.

Steam Boiler Cement.

Mix two parts of finely powdered lithage with one part of very fine sand, and one part of quicklime which has been allowed to slack spontaneously by exposure to the air. This mixture may be kept for any length of time without injuring. In using it a portion is mixed into paste with linseed oil, or, still better, boiled linseed oil. In this state it must be quickly applied, as it soon becomes hard.

Circular Sawing Machine.

An improved circular sawing machine has been patented by Messrs. Florian Reinhart and Theodore R. McDonald, of Toledo, O. This invention consists of rotary feeders and saws for cutting off both ends of felly and shaft sticks for wagon stock, also any other sticks to be equalized in length, the rotary feeders being provided with means for taking the sticks up one by one on the faces of the feeders from a table whereon they are placed for the purpose, carrying the sticks past the saws, by which the sticks are cut to the lengths required.

Improved Wagon Spring.

An improved wagon spring, patented by Mr. Albert H. Cadugan, of Wales Center, N. Y., consists in coiled springs arranged between the bolsters of a farm wagon, and riders for the wagon box bed to rest on, the riders being located over the bolsters, and secured and guided by the bolster stakes in their play upon the springs, the springs being so contrived that as they are compressed by the load, their power is proportionately increased by the shortening of the distance between the bearing points of the supporting arms and the coils of the springs for uniformity of elasticity with light and heavy loads.

Tempering Drills and Chisels.

Large drills and cold chisels are hardened and tempered at one operation, the cutting edge being cooled and hardened while the upper part is left hot. When taken from the water the heat from the shank passes toward the cutting edge and brings it to the right degree of softness. Small drills may be best tempered in the flame of a lamp. A spirit lamp is best, and the neatest plan is to heat the drill a short distance from the point and allow the heat to flow towards the cutting edge. As soon as the right color is seen on the edge, the entire tool is plunged into water and cooled. In this way the shank is kept soft and the tool is not apt to snap off.

Browning Gun Barrels.

To obtain a handsomely browned barrel, we must not only use a first rate recipe, but we must apply a good deal of skill and no small amount of hard work. When barrels are imperfectly browned, the fault lies more frequently in defective work than in the use of a poor recipe. The following are the directions given in the United States Ordnance Manual, and it is to be presumed that these are the directions that are to be followed in the Government armories. Mixture: Spirits of wine, 1½ oz.; tincture of steel, 1½ oz; corrosive sublimate, 1½ oz.; sweet spirits of nitre, 1½ oz.; blue vitriol, 1 oz.; nitric acid, ¾ oz. To be mixed and dissolved in one quart of warm water, the mixture to be kept in glass bottles and not in earthen jugs.

Drilling Glass.

For drilling holes in glass, a common steel drill, well made and well tempered, is the best tool. The steel should be forged at a low temperature, so as to be sure not to burn it, and then tempered as hard as possible in a bath of salt water that has been well boiled. Such a drill will go through glass very rapidly if kept well moistened with turpentine in which some camphor has been dissolved. Dilute sulphuric acid is equally good, if not better. It is stated that at Berlin glass castings for pump-barrels, etc., are drilled, planed and bored, like iron ones, and in the same lathes and machines, by the aid of sulphuric acid. A little practice with these different plans will enable the operator to cut and work glass as easily as brass or iron.

Soldering.

Advantage may be taken of the varying degrees of fusibility of solders to make several joints in the same piece of work. Thus, if the first joint has been made with fine tinners' solder, there would be no danger of melting it in making a joint near it with bismuth solder, composed of lead, 4; tin, 4; bismuth, 1; and the melting point of both is far enough removed from that of a solder composed of lead, 2; tin, 1; and bismuth, 2; to be in no danger of fusion during the use of the latter. Soft solders do not make malleable joints. To join brass, copper or iron so as to have the joint very strong and malleable, hard solder must be used. For this purpose equal parts of silver and brass will be found excellent, though for iron, copper, or very infusible brass, nothing is better than silver coin rolled out thin, which may be done by any silversmith or dentist. This makes decidedly the toughest of all joints, and as a little silver goes a long way, it is not very expensive. For most hard coal borax is the best flux.

ITEMS OF INTEREST.

Crucible cast steel is recognized the world over as the best steel.

THE works of the King & Armstrong Varnish Works, Akron, are being rapidly proceeded with.

THE Union Railroad Elevator Co., Toledo, has increased its capital stock from $200,000 to $250,000.

A NEW industry springing up in the South is the manufacture of sulphuric acid from iron pyrites.

OVER one-half of the new manufactories started in the South during the past two years belong to Northern capitalists.

ENGLAND has thirty electric light companies, with a capital of over $30,000,000. Nearly as much money is similarly invested in France.

AT a stenographic exhibition in Paris twenty-four different systems of shorthand were on view. Among other curiosities was a postal card containing 44,000 words.

THE coal fields of the United States have an area, it is estimated, of nearly 200,000 square miles, or ten times that of all the other coal producing countries in the world.

THE Bell patent of the telephone is estimated to be well worth $10,000,000. The consolidated telephone interests of the United States are valued at from $100,000,000 to $150,000,000.

BLOTTING paper, which not merely dries, but removes a freshly-made ink blot, is prepared according to a German paper, by passing thick blotting paper through a concentrated solution of oxalic acid, and then drying quickly.

THE Joliet Steel Company, of Chicago, have just closed a contract with Jacob Reese, of Pittsburgh, says the *Manufacturer*, by which they become a member of the "pool" to control the process of producing burnished steel shafting in the United States.

A NUMBER of copper miners of Lake Superior, while cutting down a dead cedar recently, found a small and well-shaped hammer in the centre of the tree. The tree was estimated at some 250 years of age and the hammer recognized as a tool of the ancient copper miners.

THE world's product of silk is estimated at $400,000,000, and something over 500,000 operatives are employed in this industry. France leads with 170,000 operatives and a product of $240,000,000. According to the report of Mr. Wyckoff, 44,440 persons are employed in the United States in the manufacture of silk, and the total valne of the product, is $34,410,463, thus producing about eight per cent. of the total production of the world.

THE settlement of wages in the coal trade in England has tended to allay the uneasy feeling previously existing as to the possible stoppage of supplies. The advance in price of coal to some extent affects the cost of production in the iron trade; but it is felt that unless there is a continued restriction of the output, the production of coal will soon again overtake requirements to such an extent as to prelude the possibility of high prices being maintained.

OPINIONS differ widely among rubber men as to the probabilities of a decline in rubber, some anticipating it before January, others not before June, and a few fearing that the rise has been caused more by the large increase of late years in the use of rubber goods than by a mere speculative movement, and that consequently much time will elapse before the system of supply can be developed to keep pace with the demand. The impression seems to be general, however, that the arrivals of rubber now coming will determine prices for months to come.

USEFUL RECEIPTS.

ANTIQUE BRONZE.—Dissolve 1 oz. sal ammoniac, 5 oz. cream tartar, and 6 oz. common salt in 1 pint of hot water; add 2 oz. nitrate of copper dissolved in ½ pint of water; mix well, and, by means of a brush, apply it repeatedly to the article, which should be placed in a damp situation.

PREVENTION OF MOLD IN GOODS.—A preparation for the prevention of mold, mildew, and dry rot, which has recently been proposed, and is called antimerulion, consists of boracic acid, common salt and silica, and is applied to woodwork and masonry by means of a brush. It is said that in factories where moist fumes and vapors are evolved, favoring the production of mold and fungus, this acts as a protection for the building. The so-called "doubly prepared antimerulion" consists of infusorial silica, with the addition of 20 per cent. of boracic acid, and should be scattered in moist or damp places. The simple dry antimerulion contains, besides the infusorial earth, only about 8 per cent. of boracic acid, is less active, and is used principally to exclude heat and atmospheric air; as, for example, in ice cellars, water pipes, &c.

TO SILVER IRON.—First cover the iron with mercury, and silver by the galvanic process. By heating to 300 degrees C., the mercury evaporates and the silver layer is fixed. Ironware is first heated with diluted hydrochloric acid, and then dipped in a solution of nitrate of mercury, being at the same time in communication with the zinc pole of an electric battery, a piece of gas carbon or platinum being used as an anode for the other pole. The metal is soon covered with a layer of quicksilver, is then taken out and well washed and silvered in a silver solution. To save silver the ware can be first covered with a layer of tin; one part of cream of tartar is dissolved in eight parts of boiling water, and one or more tin anodes are joined with the carbon pole of a Bunsen element. The zinc pole communicates with a well-cleaned piece of copper, and the battery is made to act till enough tin has deposited on the copper, when this is taken out and the ironware put in its place. The ware thus covered with tin chemically pure and silvered, is much cheaper than any other silvered metals.

TO TIGHTEN WAGON TIRES.—Apply some leather rings between the shoulders of the outer ends of the spokes and the corresponding portions of the felloes. To do this, procure a number of small pieces of leather from an inch and a half to two inches in diameter, make round holes in the centre of these pieces, and make a straight cut from the hole to the outer edge of the pieces so as to form open rings. The holes must be made of a size that will nicely fit the tenons on the ends of the spokes. Place a fulcrum on the top of the hub on which to rest a lever. Let the short end come under the felloe near the spoke, while an assistant bears down on the long end sufficiently to raise the felloe and expose the shoulder and tenon of the spoke. Open one of the leather rings and fit it nicely around the tenon, hold it to its place while the assistant works the lever and sets the felloe firmly upon the spoke by a blow or two upon the tire. Having repeated this process with a sufficient number of spokes to make the tire all right, trim off the protecting leather even with the surface of the spokes and the task is done. If the pieces of leather are spongy they should be hammered down before using.

PASTE FOR DRIVING BELTS.—A French paper gives this recipe for india rubber paste for driving belts. Half a kilogram of finely-cut caoutchouc is melted with half a kilogram of oil of turpentine in a well-covered iron pot at a temperature of 50 degrees C. When all is melted 400 grm. colophony and afterwards 400 grm. yellow wax are added to the mixture, which must be stirred now and then. In another pot 1.5 kilogram of whale oil and 0.5 kilogram of tallow are heated till the latter is melted, and then the contents of the two pots are mixed while hot with continual stirring, which is continued till the mixture solidifies. The use of the paste is as follows: Old brittle belts are brushed over with it in the sun or in a warm room and allowed to dry. While being used the inner side of new as well as old straps is from time to time smeared with the paste, which renders them durable and causes them to adhere well to the pulleys. Instead of pure caoutchouc, india-rubber waste, which has previously been boiled with caustic soda solution for a quarter to half an hour, may be used; about 25 grm. should be taken.

PRACTICAL MECHANICS.

HOW AXES ARE MADE.

Formerly all the materials used in the manufacture of American axes consisted of imported material; now, everything is American. We propose to follow a piece of rough iron through the various processes until it emerges a finely polished axe: First, bar iron $2\frac{3}{4}\times\frac{3}{4}$ inch is placed between large shears and junked up into proper lengths. Each piece is called a pattern, two of which are worked together. One lies in the furnace heating while the other is worked by the forger. The pattern, at white heat, is taken to a trip hammer, furnished with suitable dies, where the ends are drawn and plated, so that when brought together the eye is formed, a section in the middle being left to form the head of the axe. The pattern being drawn is now turned, so as to bring the ends together, a slug being placed between the ends to give greater thickness below the eye of the axe. When at welding heat the pattern is taken to a trip hammer and welded solid below the eye, forming what is termed the poll. Two men make the polls; in fact, this is the custom all the way through, each gang performing a certain part of the work. The poll is taken to the bitt-trimmer, where it is trimmed to the required form. It is now ready for the steel. The steel which forms the edge of the axe comes in bars, and is cut up and prepared by having the edges turned up. The steel is now placed on to the poll, the edges coming up on either side. The steel is well supplied with ground borax, without which a union of the iron and steel cannot be had. After heating it goes to another trip hammer, the iron and steel are firmly welded and the bitt drawn. At this point the material begins to look like an axe. At the next heating the axe is taken to another hammer, where the steel is condensed and refined in the most thorough manner; then to another hammer, where the iron from the eye down to the steel is swaged. The axe is placed in another furnace, so that the head will heat while the bitt remains comparatively cool. When hot the head is squared under another hammer, the eye perfected, and the axe finally straightened. We now have a perfect axe in the rough. The next operation is the tempering. The axes are slowly and evenly heated, when they are plunged into brine, which makes them as hard and brittle as glass. Again they are placed over a fire until the temper is reduced to the required point, which is known by the the color of the metal, and again submerged in water. The next process is the grinding, which is done on two large revolving stones, one weighing three, and the other one and a half tons. A stone of the latter size is used up in twelve days. All the imperfections are ground out, the axe turned and edged. Next it goes to the polishing-room, where it is polished on an emery wheel until it becomes as bright as a mirror. Here the axes are weighed, stamped and bronzed or painted, when a perfect axe is made and ready for packing. Some are not polished, but are taken from the grindstones and painted black all over. This class is preferred by lumbermen.

INDUSTRIAL SCIENCE.

STEEL WIRE AND CASTING.

Much as steel gains in strength by the process of rolling, it gains still more by that of wire-drawing. No form of steel is comparable, in respect of strength and toughness, to that which has been drawn into the form of wire or ribbon; and in the case of its application in that form to the strengthening of a cylinder, it has the additional advantage of admitting of being laid on with a more favorable adjustment of tension than is practicable with a solid hoop of considerable thickness. But even with wire, the best tensional condition of giving strength to a cylinder can only be approximately attained, owing to the fact, which is commonly overlooked, that in bending a wire over a cylinder it is impossible to give the proper degree of stretch to both of its sides. The outer side, having a larger circle to describe, must necessarily undergo greater elongation than the inside; and in fact, unless the wire be laid on at a far higher strain than would be necessary or beneficial in the case of rings, the inside, acting as a fulcrum to stretch the outside, will assume a state of compression, which can only be taken off by expanding the cylinder after the wire has been laid on. The thinner the wire the less will this disadvantage be felt; and for this reason a given area of section is much better in the flat or ribbon form, than either round or square.

Great additional strength is given to steel wire by tempering in manufacture, and the highest strength is attained by passing the wire through the die as a final operation after the tempering process. The effect of this treatment is to put a very hard skin upon the wire, which, though greatly adding to the strength, is unfavorable for bending, and a very slight injury to the surface greatly conduces to fracture. Ductility is of paramount importance in wire that has to be rolled at a high tension on a cylinder, and, for this reason, wire tempered after, instead of before, finishing is safer, though not so strong. If the wire be thick, judicious annealing, though it lessens the ultimate strain which the wire will bear, raises in a very marked degree the limit of elasticity. We have found that steel wire of about 0.2 in. thick, of great ultimate strength, began to stretch permanently at a tension as low as 25 tons per square inch, while after being properly annealed it would bear 35 tons before permanent movement. The explanation of this curious fact is probably to be found in the removal by the annealing process of the contending state of tension produced by the drawing or tempering on the inner and the outer portions of the wire. This view is enforced by the fact that when the thickness of the ribbon was reduced to somewhat less than half, this advantage of the annealing process almost wholly disappeared, and the wire was simply softened or rendered more ductile.

Castings of steel unhammered are improved by being tempered in oil in much the same degree as the forged material. Test pieces from a cast trunnion of steel gave the following results: Before tempering the elastic limit was 16 tons, breaking load 27.8 tons, elongation in 2 in., 7.5 per cent. After tempering, E. L., 25 tons; B. W., 37.7 tons; Ex., 12.5 per cent; showing a great improvement under every head. The quantity of combined carbon contained in this specimen was 0.36 per cent. The objection to the use of cast steel in the unhammered form is that it is liable to unsoundness from air bubles. The unsoundness from this cause would be greatly mitigated by casting under pressure. There is much less sacrifice of ductility or toughness when increase of strength is obtained by tempering than by increase of carbon; and, in fact, the advantage of tempering in oil is so apparent, both in the case of steel casting and of steel which has been either rolled or forged, that there is strong inducement for engineers to avail themselves of the process for increasing the efficiency of the material in nearly all its applications. The saving of the weight of material necessary for a given purpose would amply repay the cost of the tempering, and in the case of bridges of great span, where the strams are chiefly due to the weight of the structure independent of its load, the economy effected would be far more than proportionate to the increase of tensile strength in the material. Experiments have not yet been sufficiently extended to enable us to speak definitely as to the best proportion of combined carbon for steel, to which the tempering process is to be applied, but excellent results can be obtained with steel containing 0.35 per cent. carbon. If the masses to be dealt with are thin, less will suffice, and if thick more will be required, but it is quite possible that the mode of applying the oil in the tempering process might be improved so as to render it more efficacious where the bulk of the steel is large.

GERMAN SILVER.—German silver is rolled cold, and requires specially powerful machinery. The strip is frequently annealed during the rolling. The secret of success in the manufacture of this alloy is the employment of skilled labor, and of the best nickel, copper, and spelter. For the purpose of coinage an alloy of three parts of copper and one part of nickel is employed. This alloy is white, and sufficiently ductile to be rolled into sheets and coined. It is eminently suited to the purpose, as, owing to the greater value of nickel, the coins are comparatively small. Nickel requires special skill in working. Out of a hundred casters only one or two can successfully cast. German silver ingots, which reqnire special treatment. As the metal cools and solidifies in the mold it contracts very much, and the skill of the caster is shown by the manner in which he "feeds" the ingot towards the end of the casting in order to make it solid.

A PARALLEL line to the Nickel road is to be built.

ROLLING MILLS AND STEEL WORKS IN THE LAKE COUNTIES.

The Bartlett Iron and Steel Works propose to erect works at Vermillion, Erie county.

The Toledo Rolling Mill Co. intends to erect a rolling mill at Toledo, Lucas county, within 12 months.

The Toledo Hay Steel Rolling Mill Co. was incorporated in 1881, and proposes to make rails, bars, sheets, and plates.

Number of rolling mills and steel works in the Lake region: 9. Of these, 3 are rail mills, 1 making only light T and street rails; 1 makes Bessemer steel, 2 make open-hearth steel, and 1 makes crucible steel.

Cleveland Hardware Co., Cleveland. Built in 1876; 1 heating furnace, one 9-inch train of rolls; product, shapes for wagon hardware; annual capacity, 4,500 net tons. L. McBride, president; A. W. Train secretary; S. E. Brown, treasurer and manager.

The following information is from the Directory to the Iron and Steel Works of the United States for 1882, published by the American Iron and Steel Association. Having already published the details furnished as to the Cleveland Rolling Mills, we omit it from the list:

Forest City Iron Works, G. J. Atkins & Co., Union st., Cleveland. Built in 1866-7; 17 single puddling and 3 heating furnaces, and 3 trains of rolls (one 9, one 12, and one 18-inch); product, band and light bar iron; specialtias, nut, bolt and refined carriage iron. Works were formerly part of the Union Iron Works.

Cleveland Crucible Steel Co., Garden street, crossing C. & P. R.R., Cleveland. Built in 1880; 8 steel-melting holes, 5 heating furnaces, one 9-in. train of rolls, and 3 hammers; 32 pots can be used at each heat; product, tool, machinery and spring steel; annual capacity, 2,400 net tons. J. H. Clark, president; E. M. Grant, secretary-treasurer and superintendent.

Sandusky Rolling Mill and Manufacturing Co., Sandusky, Erie county. Put in operation in October, 1873; 6 single puddling furnaces, 8 heating furnaces, 1 hammer, and 2 trains of rolls (one 18 and one 19 inch); product, iron and steel rails; steel rails rolled from imported blooms; annual capacity, 30,000 net tons. Formerly called Nes Silicon Steel Works. R. H. Lewis, general manager.

Britton Iron and Steel Co., Cleveland, Cuyahoga county. Built in 1851; rebuilt in 1873; 5 single puddling and 10 knobbling furnaces, 7 heating furnaces, 3 train rolls, and 1 hammer; product, black and galvanized sheet iron; annual capacity, 5,000 net tons. Formerly called Cleveland Boiler Plate Manufacturing Co., and afterwards Standard Iron Co. J. W. Britton, president and manager; Harvey H. Brown, vice president; Ralph W. Hickox, secretary and treasurer.

Union Iron Works, Union Rolling Mill Co., 127 Superior st., Cleveland. Works at Newburgh. Built in 1866-7; 14 single puddling and 5 heating furnaces, and 4 trains of rolls; product, bar iron and light T and street rails; specialties, "Union Refined" bar and cold-straightened shafting; daily capacity, 110 net tons of finished iron. S. W. Sessions, president; A. S. Upson, vice president; Samuel Frisbie, secretary; S. A. Fuller, treasurer; J. Morgan Coleman, superintendent.

Otis Iron and Steel Works, Otis Iron and Steel Co., Cleveland. Built in 1873-4; put in operation January 1, 1875; 7 Siemens heating furnaces, 4 hammers, two 7-gross-ton and four 15-gross-ton Siemens open-hearth furnaces, and 4 trains of rolls (one 10, one 20, and two 31-inch); product, steel plate, bar steel, and forgings. Charles A. Otis, president, Thomas Jopling, treasurer; J. K. Bole, secretary; S. T. Wellman, superintendent.

Lake Erie Iron Works, Lake Erie Iron Co., office and ware-house, 104 and 106 St. Clair st., Cleveland. Built in 1852; 16 puddling furnaces, 19 heating furnaces, 4 trains of rolls, and 13 hammers; product, steel axles, iron fagoted car and locomotive axles, iron and steel forgings of every description, iron shafting up to 20 inch round, and merchant bar iron; annual capacity, 19,000 net tons. Nut and bolt works recently added, producing 20 tons daily of nuts and bolts of every description used by railroads, car builders, and for agricultural implements. W. C. Scofield, president; Edward Lewis, vice president; C. W. Scofield, Secretary and treasurer; James E. Lewis, superintendent; S. A. Sague, business manager.

SCIENCE AND INVENTION.

CUTTING AND SHAPING RAILROAD LINKS.—Manager Williams, of Brown, Bonnell & Co., has invented an ingenious machine for cutting and shaping railroad links. The machine hitherto used for this purpose in the link and pin department was constantly breaking, and thus causing a great deal of annoyance and expense. To remedy this evil Mr. Williams went to work and invented the machine spoken of. During the past week the machine has been set up in the 12-inch mill, and is working satisfactorily. So far not a break has occurred.

COMBINATION OF ASBESTOS AND INDIA RUBBER.—The combination of asbestos with india rubber has been very successful in its application to valves of large size for steam, Mr. B. Rhodes, of London, the patentee, having successfully applied it to valves at the numerous chemical color works that abound on Bow Common. The advantage of the material is its great durability under steam, as the heat does not affect the asbestos, and new settings can be readily applied without breaking any joints or removing the body of a valve—a point of great consideration where a large mill is depending on the steam valve for motive power.

STEEL WHEELS.—The Cooper cushioned steel wheel, manufactured by the Boston Standard Wheel Co., consists of a body of cast iron with a tire of steel shrunk upon it after the manner of all other steel wheels. Prepared rubber is forced between the body and the rim and then vulcanized, thus forming an elastic cushion between the steel and the iron, effectually preventing all jarring. One of the objects of the inventor in producing this wheel was to provide against crystallization, which is now well understood to be one of the principal causes of the severest accidents upon railways.—*Boston Com. Bulletin.*

THE GYROGRAPH.—By means of what he calls a gyrograph, Dr. Caudeze has been able to take photographs of landscapes from the windows of a train running at the rate of forty miles an hour. The apparatus consists of a copper tube similar to that which carries the lenses in an ordinary camera, but in it the lenses are placed on opposite sides, parallel to the axis. Within is a shutter similar to the box of a stop-cock. It presents two square openings, which do not let the rays pass in making a quarter of a turn. A rotary motion is produced by tde action of a spring. Only an exposure of the one-hundredth of a second is necessary to obtain wonderfully distinct views.

CASKS OF STEEL.—An English firm have recently turned their attention to the manufacture of casks and barrels of steel. The two edges of the sheet of steel which form the cask are brazed together in such a manner as to justify the title of "seamless," which the patentees have supplied to these productions. The head of the barrel is also riveted to the body, so as to leave no seam, and the end rims are shrunk on hot, thus making a very solid end, whilst, at the same time, the rims are thick enough to give a good purchase to the grappling hooks of hoists and cranes for loading and unloading purposes. The bush for the tap does not project beyond the rim, so that the nozzle is not liable to be knocked about and injured. The casks are more durable than wood, less bulky, and it is said lighter—an eighteen-gallon steel cask weighing some ten pounds less—a not unimportant consideration as regards transit. In point of shape the steel barrel is exactly that of a well-formed wood one.

MACHINE FOR MIXING MOLDING SAND.—The object of this machine, invented by M. Lalonde, is to grind the sand, to sift it, and to mix it, and mechanically moisten it, in order to make it fit for all kinds of molding. A horizontal sheet or cast-iron cylinder, with a surface of about 50 decimetre cubes, has in the direction of the length one or more openings, disposed to receive wire gauge, which, at each turn of cylinder, throws out the sand crushed by an interior roller. The two extremities of the cylinder are closed by blanks, supplied with central axles. One of the axles is made longer than the other, in such a way as to support a mixing machine turning in a cast-iron pan. In this vessel the sand and other ingredients are mixed together dry for several minutes. A water pipe, established above the mixer and provided with taps, serves to supply a little water, which moistens the mixture. At the bottom of the box is a small sliding door, which can be opened by hand, and through which the mixed sand falls.

THE POWER OF TURBINES.—The amount of power which may be obtained from any given quantity and fall of water is popularly regarded as the only test of the value of a turbine, and different makers are much to blame in fostering so erroneous a prejudice. The variations in amount of power gained from any given fall of water by any form of turbine whatever, are really small, provided that a bad turbine of one kind is not unfairly contrasted with a good turbine of another construction. Such comparisons, however, are frequently made, and in such cases a really inferior machine gets undue credit for some accidental error in the design or construction of a better kind. This sort of comparison has done much to injure the reputation of turbines, and needs only stating to be condemned. The methods of obtaining a high effective duty are perfectly well-known to all intelligent makers of turbines, and so far as these arrangements interfere not with the permanent durability of the work, they are to be commended. But it is an error to suppose that because a turbine when new and clean gives a high duty, it will necessarily do so when worn and dirty. On the contrary, it is better to be content with a more moderate amount of work and obtain a more permanently useful machine.

FLOW OF LIQUID IN PIPES.—At a recent meeting of the Physical Society, London, Mr. W. F. Stanley read a paper on the flow of liquids in pipes, and showed that liquids move by rolling contact upon the resistant surfaces of the pipe, and not by a sliding or shearing action, as has been generally assumed. The difficulty in carrying out his experiments lay in the fact that when a liquid flows through a pipe the friction of the pipe prevents the free motion of the rolling particles. For this reason with circular pipes the evidence of rolling contact is of a very complex character, and particles of solid matter, for example descending in glass pipes makes a spiral or zig-zag path very difficult to follow. Evidence of surface rotation was, however, found in the descent of a liquid cylinder or column of dense mastic varnish through a tall, narrow beaker from a glass funnel. The length of the descent was about 18 inches, and the width of the column 4 inches. It carried down with it small particles of solid matter and tiny air bubbles, which were seen to be in rapid rotation. Mr. Stanley illustrated his theory with a number of corroborative experiments with pipes of different forms.

ELECTRO-DEPOSITION OF TIN.—Improvements have recently been made in connection with the manufacture of tin plate with the view of reducing to practice the tinning of the plates by electro deposition of the metal. In carrying out the improvement the inventor takes what are known as "black-plates" which have been "pickled," annealed, cold rolled and again "pickled," preparatory to being tinned. These plates having been properly cleaned, are immersed and rinsed in a basin of clean water, and are then passed into the depositing bath, being suspended from a rack frame or dipping apparatus. The bath being charged with plates, a dynamo-electric machine is set to work and tin will be deposited upon the plates, the thickness of the deposit varying according to the strength of the current and the time of immersion. A specially constructed resistance coil is put in the circuit to regulate the strength of the current. When sufficient tin has been deposited the plates are removed from the bath, rinsed in hot or boiling water, and passed into hot (hard wood) sawdust to dry the surface, and for most practical purposes these plates are bright and lustrous enough without further treatment. If it be desired to give the plates the appearance of frosted silver, they are passed through fine wire scratch brushes, but for giving a burnished surface either a set of scratch brushes and journal buffing rolls are employed or two sets of scratch brushes and a burnishing tool.

IMPROVEMENT IN NAILING MACHINES.—Mr. F. Rochow, of Brooklyn, N. Y., has patented an improvement in nail-feeding attachments for nailing machines, with special reference to such as are intended to be run by steam power. This invention has for its object to scatter the nails that are distributed by the feed-wheel so as to bring them separated into position in the guide troughs, whence they are moved to the lateral conveyor. The present invention is an improvement upon an earlier machine designed by the same inventor. The action of the machine will be understood by a brief description. A hopper is placed in an inclined position on the frame of the nailing machine. This hopper is open below and communicates with the guide troughs, each of which has a slot in its bottom. In the lower part of the hopper is a feed-wheel which takes the nails from it and throws them into the guide troughs. A scatterer, which is one of the important features of the invention, consists of a number of slotted arms against which the nails are thrown by the feed-wheel. The action of these slotted arms is such as to gradually right the nails in position as they drop from one arm to the other before they reach the guide troughs already mentioned. The special feature of the invention is a spring connection which arrests the motion of the feed-wheel if a nail should be caught between it and the lower part of the hopper. This stoppage is produced without arresting the motive power or breaking the parts.

THE BROOKLYN BRIDGE.—The gigantic structure which with a span stretches across the East River between New York and Brooklyn is by no means the largest bridge in the world. Yet it is just now making more noise than any other bridge. This is partly because it has cost so much money, and partly because some of the many swindles in connection with the way in which the money has been spent have recently been held up in new light to the public gaze. This bridge is only half as long from abutment to abutment as that which spans the Susquehanna at Havre de Grace, and about one-sixth as long as the Victoria tabular bridge across the St. Lawrence at Montreal; but its span of 1,625 feet is the longest span of any in the world. For a dozen years the bridge has been slowly rising and increasing, until now it appears to the casual beholder ready for traffic. The day of its opening to the public is as yet, however, one of those things in the dim and uncertain future, of which nobody can, with certainty, fix the date. When, in 1867, a company was chartered to build this bridge, the limit of time set for completion was 1870, and the estimated cost was $7,000,000. Now the expenditure, including interest paid out on the bonds of New York and Brooklyn issued to pay for it, amounts to about $22,000,000, and the monster is not only incomplete, but likely to remain so for an indefinite time. Like a guardian angel, or something of that kind, the spirit of the departed rascal who was first prominent in its finances seems to hover over the bridge and to inspire all that appertains to it.

RUSSIAN PETROLEUM WELLS.—The increasing importance of the petroleum wells of Baku, on the Caspian sea, has led to a project being set on foot for connecting that place with Batoum, on the Black sea, by means of pipes, in order to avoid the difficulties and dangers of the railway transportation of the oil. It is proposed to pump the petroleum into tank steamers at Batoum, and very sanguine expectations are entertained as to the possibility of successfully competing with the American petroleum imported into Europe. The Baku oil tearitory is described as having an area of not less than 1,200 square miles.

BRONZING LIQUID.—Dissolve 10 parts of fuchsine and 5 parts of aniline purple in 100 parts of 95 per cent. alcohol on a water bath; after solution has taken place, add 5 parts of benzoic acid, and keep the whole boiling for 5 or 10 minutes, until the green color of the mixture has given place to a fine light bronze-brown. This liquid may be applied to all metals, as well as many other substances, yields a very brilliant coating, and dries quickly. It is applied with a brush.

TUSCARAWAS AND MAHONING VALLEY MINERS.—The miners of the Mahoning Valley have joined those of the Tuscarawas Valley in demanding an advance in wages of ten cents a ton. In the Tuscarawas Valley 600 men have left work. At the convention of the Mahoning miners at Youngstown on the 14th inst. it was decided that the demand should be made on the 20th inst.

NEW SCREW NAIL.—A screw-nail invented by Henry Dunham, Abingdon, Mass., has a tapering and twisted shank and a clinched point.

CHINA will export 81,000,000 pounds of tea this year, about 1,000,000 pounds more than last year.

Lubricating Oils.

The question of the most suitable oils for lubricating has been always regarded as most important, but it is only within the last 20 years that it has been to a great extent elucidated. The oils used are vegetable, but experience has proved many of them to be unsuitable for the purpose intended. Mineral oils were received at the very outset of their introduction with a kind of enthusiasm. Sharp criticisms were passed on them, but time and experience, which are the best tests in such cases, have fully justified the claim made for them. Mineral oils possess the quality of resisting decomposing agents better than any other, and can be brought to a higher degree of unctuousness, which they preserve even under considerable elevation of temperature. Animal oils and fats are very useful in certain cases, where, for instance, heavy metal parts used for transmitting force have to be kept lubricated—shafts, axles, etc. They resist crushing excellently, as their fluidity is not very great. Spermaceti oils, neatsfoot and lard—cold pressed and purified with muriatic lead, are those which possess the greatest lubricating quality, and their co-efficient of friction being less than that of vegetable oils they are used in preference for delicate oiling. They are decomposed, however, more easily than vegetable oils, and have more oxidizing qualities, which accounts for their more limited use. The quantity of free, fatty acids and impurities which they contain require costly refining. On some French railway lines fats obtained from the superficial saponification of t solid fatty matters are used but are very poor, and have been generally superseded by the crude colza oils, ets., mixed with animal and vegetable oils. Among vegetable oils, olive has occupied the first rank. It can be purified in a great measure by decanting and filtering without the aid of mineral acids. Oils of seasame and peanuts come next, and may be purified to a certain extent without using sulphuric acid, which greatly deteriorates their composition by depriving them of their albuminoid matters and predisposing them to decomposition, or even developing acids which attack metals. Colza and cotton-seed oils have less industrial value. Colza has, unfortunately, too high a co-efficient of friction, for it is not acid and does not congeal in winter. It is used exclusively by the Paris & Orleans Railway of France, and excellent results have been obtained from a mixture of unrefined colza, tallow, water and carbonate of soda, the proportions being varied according to the season.

Resinous oil performs only the mechanical part. When it is whipped it gets heated rapidly, oxidizes and becomes resinous, producing at the same time a large quantity of coom. The use of white lead is of very doubtful efficacy as well as that of sulphate of baryta. These mixtures are very numerous; the following are the principal: Graphite oil, india rubber; asbetos and grease; lignumvitæ and whale oil; tin and petroleum; zinc and india rubber; petroleum waste and flour; petroleum waste, oleine, sulphur and talc; glycerine, graphite, asbestos, kaolin, manganese, talc, sulphuric of lead, carbonate of lead and cork; anthracite coal and tallow; tallow, petroleum, soda and hair; mercury, bismuth and antimony, paper in leaves or pieces of textiles, impregnated with graphite and mixed with steatite, parafine, tallow, glue and soluble gums; camphor and saltpeter are frequently used in lubricating mixtures. The first condition of a good lubricating oil is to diminish the friction. M. Dollfus, of Mulhouse, made some extended experiments to ascertain the comparative friction of oils. He found that the spermaceti oil had the lowest friction and next in order paraffine oil, then neatsfoot, poppy, filtered cod liver, grease, and then refined colza and cocoanut oils.

A Big Derrick Car.—The Pardee Car & Machine Works at Watsontown, Pa., have just turned out for the New York, West Shore & Buffalo Railway a derrick, or what is more commonly known as a wreck car, that is considered by railroad men to be the strongest and most complete car of the kind ever seen in this section. It is 35 ft. long by 8 ft. in width, the frame being composed of heavy wrought channel iron, 10 in. wide, and strongly braced with diagonal braces of the same material. The improvement over other derricks consists, in part, of two 10-ton jacks, one on each side of the car, which are used in lifting the body of the car so as to relieve the trucks of all strain when in operation. The upright column, which is of cast iron, covered with boiler iron, weighs over 3,000 pounds. The entire weight of car and derrick is between 15 and 16 tons.—Railroad Gazette.

Non Condensing Engines

The best automatic non-condensing engines furnish an indicated horse power for about three pounds of good coal, depending somewhat upon the fitness of the engine for the work and the quality of the coal. With a condenser attached a consumption as low as two pounds has been reported, but this is an exceptional result; two and one-half pounds may be quoted as good practice. The larger the engine the better the showing as compared with smaller engines. For ordinary slide valve engines the coal burned per indicated horse-power will vary from nine to twelve pounds; for the sake of illustration we will say ten pounds, and that the engine is of sucn size as would require for a year's run $3,000 worth of coal; now an ordinary adjustable cut-off engine with throttling governor ought to save at least half that amount of coal, or say $1,500 per year; if the best automatic engine were employed, using two and one-half pounds of coal per horse-power, a further saving of $750 a year could be effected, or between the two extremes $2,250 per year in saving of coal without interfering in any way with the power, with the exception perhaps that the automatic engine will furnish a better power than the former engine. It is easy to see see that it is true economy to buy the best engine and pay the extra cost of construction, if the saving of fuel is an element entering into the question of selection.

New Air Engine.

A new air engine has been introduced in England with some features not generally found in such engines. The air cylinder is placed outside the casing, offering great facilities for cleaning and lubricating, also for examining the different parts. This cylinder is fitted with a metallic piston, and the shape of the cylinder enables this engine to be made as compact as possible. The action of the engine is as follows:—after the fire is made the retort becomes a dull red heat. This rise of temperature expands the small amount of air inside, which then forces the piston in the air cylinder downwards. After this expanded air has done duty, the displacer, which is actuated from the crank, forces the air which has been condensed against the cold sides of the top part of the cylinder back to the hot end of the retort.

As the piston performs its stroke, due to the expanded air in the cylinder, a small air valve is kept closed by the pressure, but as the piston makes the return stroke, a small valve on the top of the cylinder opens for a sufficient length of time to permit air to enter the cylinder to replace any air which has been permitted to escape through any defect in packing; so that it will be seen that not only is it automatic in receiving the supply of air for expansion, but also in its lubrication, for whenever this down stroke is made, a small amount of oil is drawn into the cylinder for lubricating the metallic piston. The manufacturers claim that the design admits of the engine being made much cheaper, as well as well as affording facili- for examining, lubricating, and repairing.

Nickel Plating.

An invention by which it is claimed that an equal amount of electro-plating can be done with less electro-motive force, has been patented by Mr. J. E. Chaster, of Manchester. It consists—1. In using the double citrate of nickel and ammonia instead of the double sulphate.—2. In new arangement and construction of battery for electro-plating with nickel. The cells of the battery, 3 in number, are a modification of Daniel's, in which the zinc is placed in an inner porous cell in a half saturated solution of zinc sulphate. This cell is placed in a copper or lead cell, containing saturated copper sulphate solution. This solution is kept saturated by means of addition of crystals of copper sulphate added from time to time. By these means the current from the battery is constant, different from all other batteries used for nickel plating, and further the electromotive force of the battery is such that the solution is not decomposed, and is merely sufficient to carry over the metal from the anod to the article to be plated, and does so with the smallest amount of gas given off on the article being plated. This nickel is deposited on iron articles direct without being previously plated with copper, as it adheres firmly to the iron owing to the small amount of gas being given off whilst plating.—3. A simple arrangement of portable apparatus for nickel plating. It consists of a box divided in two by a partition; on one side are three cells in series, on the other a tank lined with lead or simply of wood well covered with paraffine wax, in which the two anodes of nickel are suspended at each end and the cathode a simple bar across the tank, upon which the articles to be electro-plated are suspended by wires. Connection with the battery is made in the usual manner.

Wet and Dry Coal.—An English paper says that, though it is generally conceded now that wet bituminous coal will not make as large a quantity of steam in a boiler as dry coal, we have few figures to substantiate this. A series of tests has been recently made at Bochum, Germany, which substitutes facts for theoretical considerations. A lot of washed slack, holding eighteen per cent. of water and 9.9 per cent of ash, evaporated 5.7 pounds of water per pound of fuel; while the same coal, with only three per cent. of water made from eight to 8.5 pounds of steam. Making due allowance for moisture by reducing to a standard of like quantities of coal, free from moisture, there is found to be a direct loss by using wet coal of fourteen per cent.

Hudson River Tunnel.—Work on the Hudson River Tunnel is being steadily pushed forward, and the large air compressor built by the Clayton Steam Pump Works of Brooklyn, N. Y. (three of whose compressors have been used since the commencement of the tunnel), has been placed in position and is working at the foot of Morton Street, New York. This air compressor is of the Clayton Improved Duplex pattern, having two 22-in. diameter steam cylinders, two 24 in diameter air cylinders and 30-in. stroke. It is 20 ft. in length, 10 ft. in width; weighs 25 tons; and its working capacity is 3,750,000 cubic feet of air per 24 hours.

Tin in Colorado.—A promising discovery of tin is reported in a Denver, Colorado paper. The lode is said to be situated in the American basin, on the lake fork of the Gunison, in Hinsdale county just beyond the San Juan county line, Colorado. A poor prospector commenced work on the mine in 1874. The ore is of two kinds—leaf tin and English or silver tin, carrying also fifty ounces of silver and five ounces of gold. The vein is 12 feet wide and shows on the surface for 1,500 feet. The ore is pronounced by experts in Denver, Pueblo, and Washington the richest tin ore ever discovered in this country.

The Increasing Importance of Mica.

This mineral, simple in itself, is but an aggregation of infinitessimal crystals, which by some unkown natural process have united in a massive form, with a laminated structure capable of being sub-divided on a plane with its axis to such an extent that one cubic inch can be sub-divided by the eye into about 180 superficial inches and the same be again sub-divided by the aid of the microscope until one cubic inch of mica is made to cover four or more superficial feet. This capability of sub-division in plates or laminae is not its only peculiarity. It varies from transparency to translucency. The demand for mica, for stoves alone, is greater than the supply, thus causing an uninterrupted demand. To the uninformed it may appear strange, but mica to-day is a staple article of commerce. The fact that mica used in stoves must be replaced almost annually, creates a steady demand. Recently has been patented its application to shoes, whereby soles at a trifling expense, are rendered water-proof. And whenever the quantity of mica produced is sufficient to supply the demand and the market price is reduced, then new uses and applications of it will arise. As a lubricator it stands pre eminent, owing to its non friction qualities. Several patents exist in which this mineral in a ground state combined with oil, is used to lubricate cumbrous machinery. The market value of mica is great and at the present time the demand is such that it cannot be supplied. A piece of mica four inches by four inches, five-eighths of an inch thick will weigh one pound and has a market value of $4. A piece three by six inches one-half inch thick will weigh one pound and has a market value of $4.60 and a like relative portion of value exists except in the smallest pieces say one-half by two inches, which have a value of fifty cents per pound, and all the refuse and trimmings of the mica are readily sold to parties who pulverize them for use in the manufacture of nitroglycerine, and other dangerous explosives. It will thus be seen that in mica mining we have an industry worthy of development, and one which requires no expensive manipulation of the product subsequent to excavation.

Progress of the Telephone.—It hardly seems possible that so recently as 1877 the telephone was a toy; yet such is the case. At the present time $7,000,000 are embarked in the extension of the telephone in England, and this capital is already winning a revenue of $500,000 a year. Until a very recent time the telephone business has been a monopoly in England, of which the post-office held the controlling power, but this has been broken, and it is said that a very strong competition will very shortly be felt.

Copper in Steel — Herr Wasum gives, as a result of many experiments, the opinion that copper is not so active in rendering steel "red-short" as has been hitherto stated. Indeed, he finds that 0.862 per cent, of copper only causes a slight trace of "red-shortness," on this point differing from Eggertz, who condemns as useless steel with but 0.2 per cent. As regards sulphur, he places the limit at 0.15 per cent., but opines that even 0.1 per cent. is sufficient to cause "red-shortness" in a soft steel or one poor in manganese. The degree of "red-shortness" in steel containing both copper and sulphur does not appear to be greater than that which would be caused by the latter alone.

MARKETS.

Office of TRADE REVIEW AND WESTERN MACHINIST.

FRIDAY EVENING, November 17.

FINANCIAL.

There has been a fair demand for money, the ruling rate being 7 to 8 per cent. Money is at 5 per cent. on call and 6 per cent. on time. There is not much currency going to the country. Eastern exchange is in moderate demand and the market is strong at 1-20 per cent. discount buying and par selling. There has been an improved demand for local securities.

IRON.

In the aggregate a fair business has been done in pig iron, but prices show continued weakness, from the circumstance that purchasers confine their transactions to immediate requirements. The better brands are permanently scarce, but there is no disposition to advance quotations or to squeeze the market, events being left to take their natural course. Inquiries for several large lots of muck bar are on the market; but buyers do not care to pay outside figures. No material change has taken place in quotations of blooms. The market is quiet for merchant bar. There is a decided downward tendency in the finished iron product, to the surprise of many on both sides. In consequence of this, neither buyers nor sellers are anxious to make any engagements far ahead, but it is probable that some few of the shrewd buyers will place large orders when prices reach what they consider the lowest limits. Plate and tank are a little easier. There is a quiet market for steel rails and blooms. Stocks for old rails are scarce, and buyers are looking round for supplies. Scrap iron is at unchanged figures, with few transactions.

CINCINNATI.—Reported by Rogers, Brown & Co. The iron market is in a somewhat unsettled state. The tendency is toward improvement, but in certain directions the decline has not been wholly arrested. Southern furnaces have been selling heavily, closing large forward contracts at prices satisfactory to themselves. These lots have been taken in the Cincinnati market proper, or at near tributary points. The price for standard brands has been uniformly $21.00 cash at Cincinnati for No 1 mill or its equivalent for other grades and deliveries. The sales on this basis in two weeks probably aggregate 25,000 tons. Along Northern parallels--Detroit, Cleveland, Chicago--business continues dull and no improvement in price is noted. Charcoal prices are, if anything, a shade lower. Should the activity now prevailing in this general market extend soon to surrounding markets, prices must necessarily be adjusted on a slightly higher level. We quote for cash: Hot Blast Foundry.—Hanging Rock, C. C., No. 1, $26.00 @ $27.00; Hanging Rock, C.C., No. 2, $24.00@$25.00; Southern No. 1, $24.00@$25.00; Strong Coke No. 1, $22 50@$23:50; Strong Coke No. 2, $22 00@$22.50; Strong Coke No. 3, $21.00@$21.50; Soft Stone Coal No. 1, $22.50@23.00; Soft Stone Coal No 2, $21.00@$21.50; Forge—Strong Neutral No. 1 Mill, $21 00@$21.50; Cold Short No. 1 Mill, $20.00@$21.00. Car Wheel and Malleable — Hanging Rock C. B., $31@$33; Hanging Rock W. B., $25@$27; Southern Car Wheel Iron, $30@$32; Lake Superior Car Wheel Iron, $28@$30; Lake Superior Malleable, $28@30.

CINCINNATI—Reported by E. L. Harper & Co. The market has been fairly active throughout the week, the low prices current having invited orders from the "bears" of last week. Transactions, whether large or small, are being made upon a basis of mutual satisfaction between buyer and seller. The scarcity of some brands of No. 1 Foundry Irons renders that class firm. There is difficulty in safely forecasting the future. We quote as follows for four months: Foundry.—Hanging Rock Charcoal, No. 1, $25.75 @ 26.50; Strong Neutral Coke, No. 1, $23.00@23 50; American Scotch, No. 1, $21.00@22 00. Grey Forge.—Neutral Coke, $21.50@22.00; Cold Short, $20@20.50 Car Wheel and Malleable —Hanging Rock, C.B., $33 00@35.00; Hanging Rock, Warm Blast, $27@28 Lake Superior 1 and 2 $27@28; Lake Superior, 3 to 6, $28@30; Southern Car Wheel, $32@33.

HARDWARE.

Purchases for the most part appear to be limited to immediate requirements. Prices continue steady, and we have no changes to record for the week. There is a good business doing in nails. Prices are fully maintained on the basis of $4 net, for 10d. to 60d. Foreign Hardware is in fair request at unchanged figures. At the monthly meeting of the Lock Manufacturers' Association, held at New Haven, Conn., existing prices were confirmed. With colder weather an improvement has taken place in the wire trade, and an advance in wire is generally anticipated. Brass fittings are steady and unchanged. Lead pipe is so far steady, but with the weakness prevailing in lead, lower prices are looked for. The demand for plumbers' supplies is fair. There is a good business doing in stamped tinware, with some shading in prices. Owing to the corner in crude rubber, india rubber manufacturers throughout the country have withdrawn all outstanding quotations, and their prices will hereafter depend on the ruling rates fixed by a combination of speculators.

LEAD.

The tone of the market for Domestic Pig has continued weak with but little disposition to trade either in large or small lots. Some parcels of Western have sold at 4.80 to 4.85 cents, but in a jobbing way dealers ask 4.90, which is also the price of refined. Manufactured lead is selling rather slowly and dealers and consumers appear to have sufficient supplies of Pig for present requirements.

COPPER.

Transactions have been moderate. Sales of large lots have been effected--18 to 18¼ cents. Small dealers ask 18¼ cents. Baltimore and Western brands held at 17⅞ to 17⅝ cents. London was last cabled £69 10s for Chili bars and £75 for Best Selected.

SPELTER AND ZINC.

There is little doing in Spelter, and the market rules somewhat dull. Western brands quoted at 5¼ to 5⅜ cents, and Silesian commands about the same price. Foreign and Domestic sheet zinc from store is 6¾ to 6⅞ cents, according to quantity.

TIN AND TIN PLATES.

An easier tone prevails in the tin market. Sales have been principally for January; February delivery at 22¾ to 22⅝ cents, while on the spot business has been wholly of a jobbing character at 22¾ to 23 cents. In the London market prices show a tendency to advance; cabled is £96. 10s. We quote for round lots Banca 28 cents, Straits and Malacca 22¾ to 23, Billiton 25⅛, Australian 23 to 23¼, English L & F. 23⅞ and English Refined 23⅝. There has been a fair demand for tin plates, with prices in buyers' favor. We quote Coke Tin $5.05 to 5.10; with business possible at $5, while Charcoal Tin for shipment could be had at $5.87½.

WOOL.

The Boston and New York wool markets have been easy in tone. Sales of washed fleeces have included Ohio XX at 43c. and No. 1 Ohio at 46c.

LUMBER.

PLANK, MIXED WIDTHS.
2 inch, 12, 14 and 16 feet, together.

A 1 and 2 uppers	$50
A 3	40
B	32
C	20
D	14
E	12

1¼ and 1½ inch.

A 1 and 2 uppers	$48
A 3	40
B select	32
C	20
D	15
E	13

BOARDS.
One inch, mixed widths.

A 1 and 2 uppers	$44
A 3	36
B select	30
C	19
D	14
E	12

STOCK BOARDS.
12 Inches wide.

A 1 and 2 uppers	$45
A 3	38
B	32
C	21
D	16
E	13

STRIPS.
6 Inches wide.

A 1, 2, and 3	$42
B	32
C	22
D	16
E	12
Norway Fencing Strips	17
Norway Flooring Strips	25

WORKED LUMBER
FLOORING.

Flooring—A 3	$42
B	35
C	24
D	20
Norway Flooring—A 3	28
C	22
D	18
Matched Drop Siding, 6 inches—A 3	42
B	38
C	34
D	20

Beaded Ceiling $2 higher than Flooring.

One half inch Bevel Siding—A 1 and 2	24
A 3	20
B	18
Ash Flooring—A 1 and 2	40

BILL STUFF.

Small, joists, 12, 14 and 16 feet	$14
Timber, longer than 20 feet and over	$4 00@$6 00
less than length.	
Cedar Posts, large	30 00
" " medium	25 00
" " small	$15 to 20 00

SHINGLES, LATH AND MILL WORK

Shingles XXX	$ 4 25
Clear Butts	3 25
Lath	2 75@3 00

Surfacing, one side, adds $1.25; two sides $1 50
Matching, flooring and drop sidings, $2.25.

LAKE FREIGHTS.

COAL.

Buffalo to Chicago	$.62½@.65
Toledo to Chicago	1.00
Cleveland to Chicago	70@75
Erie to Chicago	70@75
Oswego to Chicago	1.50
Fairhaven to Chicago	1.30
Buffalo to Millwaukee	70@75
Cleveland to "	70@75
Erie to Milwaukee	75
Buffalo to Racine	80
Buffalo to Kenosha	85

IRON ORE.

Marquette to Lake Erie ports	1.25
Escanaba to Lake Erie ports	90@95
Escanaba to Chicago	90@95
Marquette to Chicago	1.15@1.20

COATES'

"Independent Lock Lever"

HAY AND GRAIN RAKE.

Patented August, 1867, January, 1875, June, 1875, and November, 1876. 60,000 now in use. Light touch of lever and driver's weight dumps it. Best self-dump in market. Twenty steel teeth. No complicated ratchet wheels, friction bands or other horse machinery needed to operate it. A small boy rakes easily twenty acres per day with the Coates' Lock Lever. Send for circulars.

A. W. COATES & CO.
Alliance, Ohio.

NERVOUS weakening disorders, night emissions and vital drain arising from Indiscretion. Send two 3c. stamps for "Treatise and List of Questions." Address DR. CLEGG, Cleveland, O.

The Detroit
LUBRICATOR COM'Y'S
Sight Feed
LUBRICATOR
Cups.

For oiling valves and cylinders of steam engines, by the only perfect method, THROUGH THE STEAM PIPE. The oil passes IN SIGHT, drop by drop, into the column of steam where it vaporizes, thus becoming a STEAM LUBRICANT, oiling perfectly every part reached by the steam. Any CLEAN OIL, black or white, light or heavy, may be used. Saves from 50 to 90 per cent. in oil and wear of machinery, thus paying for itself several times a year. A cup will be sent to responsible parties on twenty day's trial if desired. In ordering give diameter of cylinder.

NOTICE.

The first Lubricators ever made, showing the oil passing drop by drop through a transparent water chamber, were devised by us, and the same are fully embraced by many Letters Patent owned and controlled by us, which have been sustained in several hotly contested legal contests. Our customers, therefore, need have NO FEARS IN THEIR PURCHASE AND USE. We are the sole owners of the "Sight Feed" feature as claimed by us, and we shall hold purchasers and users responsible who are encroaching upon our rights by the unfawful use of our device. Address,

DETROIT LUBRICATOR CO.
Office, 98 Griswold Street, Detroit, Mich.

Note—In our recent suit against the American Lubricator Co., of Detroit, before Justice Stanley Matthews, of the U. S. Supreme Court, involving their "sight-feed" feature, a decree was rendered in our favor August 20, 1881. (Mention this paper)

WM. BINGHAM Sole Agent for this territory.

"Perhaps the most judiciously edited magazine in the world."—[The Nation, N. Y., Sept. 1882.

THE CENTURY
FOR 1882-83.

The twelfth year of this magazine—the first under the new name, and the most successful in its history, closed with the October number. The circulation has shown a large gain over that of the preceding season, and THE CENTURY begins its thirteenth year with an addition of

140,000 Copies,

The following are the leading features:

A New Novel by W. D. Howells, to succeed this author's "Modern Instance." It will be an international story, entitled "A Sea Change."

Life in the Thirteen Colonies, by Edward Eggleston.—the leading historical feature of the year; to consist of a number of papers, on such topics as, "The Beginning of a Nation," "Social Life in the Colonies," etc., the whole forming a complete history of the United States.

A Novelette of Mining Life, by Mary Hallock Foote, entitled "The Led-Horse Claim" to be illustrated by the author.

The Point of View, by Henry James, Jr., a series of eight letters from imaginary persons of various nationalities, criticising Ameica, its people, society, manners, railroads, etc.

"Rudder Grange Abroad," by Frank R. Stockton, a continuation of the droll "Rudder Grange" stories, the scene being now in Europe.

The New Era in American House-Building, a series of four papers, fully illustrated, devoted to (1) City Houses, (2) Country Houses, (3) Churches, and (4) Public Buildings.

The Creoles of Louisiana, by George W. Cable, author of "Old Creole Days," etc.; a fresh and graphic narrative, richly illustrated.

My Adventures in Zuni, by Frank H. Cushing, government ethnologist, an adopted member of the Zuni tribe of Indians. Illustrated.

Illustrated Papers on the National Capital, including "The Capital," "The Supreme Court," "The White House," etc.

The Missions of Southern California, by "H. H.," three or four papers of exceedingly interesting character, richly illustrated.

Miscellaneous.

Further work is expected from E. C. Stedman, Thomas Hughes, Joel Chandler Harris ("Uncle Remus"), Charles Dudley Warner, John Burroughs, E. V. Smalley, H. H. Boyesen, and a long list of others.

The subscription price is $4.00 a year; 35 cents a number. Subscriptions should begin with the November number, and to enable new subscribers to commence with the new series under THE CENTURY name, we make the following

SPECIAL OFFER.

A year's subscription from Nov., 1882, and the twelve numbers of the past year, unbound, $6.00. A subscription and the twelve back numbers bound in two elegant volumes with gilt top, $7.50.

W. S. IDE, President. J. C. Manager.

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VULCAN IRON WORKS CO.,
Builders of
IMPROVED
Forging Tools,
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STEAM DROP HAMMERS,
STEAM HAMMERS,
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CIRCULARS, PHOTOGRAPHS, AND PRICES FURNISHED ON APPLICATION.

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AIR FURNACE PROCESS.

MICHIGAN MALLEABLE IRON COMPANY:

Manufacturers of

REFINED
MALLEABLE IRON CASTINGS,

Detroit, Mich.

THE MORGAN
Variable Blast Water Tuyere Iron.

With the front plate removed, showing the rotating air tubes through which four different currents of air may be passed thereby making any sized fire from two to eighteen in. diameter.

It actually saves one-half of the coal; makes an intense heat just where it is needed, and burns no coal unnecessarily. Always gives a centre blast, and cleans all the dirt from the fire. Supplies hot water.

We also furnish a Tuyere on same principle without Water Attachment. All goods guaranteed to please or no sale. Catalogue sent free.

Address, A. W. MORGAN & CO.
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Cleveland Wholesale Prices.

HARDWARE.

Adzes.

Carpenter's.....per doz $18 40
Ship..... " " 18 75
Heavy railroad.... " " 19 50

Axes.

Hunt's.....₱ doz $ 9 50
Lippincott's Crown ₱ doz 9 00
Cut More ₱ doz 9 00
Peck's Double Bit..₱ doz 22 00
"Champion Blade ₱ doz 11 00

Anvils.

Eagle, Amer...per lb. 10c dis 20
Wright's.....10¼c@11c
Armitage's Mouse Hole 9¼@9¾c
Trenton.....10¾c
Wilkinson's.....10⅝c

Anvil Vise and Drill.

Millers Falls Co. $28.....dis 20
Cheney Anvil and Vise..dis 25&2

Vises.

Solid Box, list of July 1, '79, dis 35
Solid "Crown" (A. H. Hildick).....40 to 100 lb. 15c net
Solid, Peter Wright's.....15½
Solid, Wilkinson's.....18½
Parallel, Parker's.....dis 40
Saw Filers, Hopkins' ₱ doz $17.50, dis 10
Reading.....dis 45&10
Lowell Hand Vises.....dis 20
Richardson's Vise and Anvil.....dis 25

Augurs and Bits.

C S cut augers.....dis 40&10
do do do bits.....40&10
D C gimlet do Ives.....dis 50
Snells bits.....dis 40
Russell Jennings' augers dis 16⅔ &10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Berea, per doz.....4 00
Eagle, per doz.....5 00

Apple Parers.

Domestic & Reading ₱ doz.$7 50
Turn Table.....5 00

Bolts.

Machine.....dis 60
Plow.....dis 50
Plow, R. B. & W.....dis 40
Cast Iron Barrel Shutter, etc.....dis 50&10
Cast Iron Chain (Sargent' list).....dis 60&10
Ives' Pat. Door Bolts..dis 50
Wrought Barrel.....dis 55&10
Wrought Square.....dis 55&10
Wr'g't Shut'r, all iron, Stanley's list.....dis 50&10
Tire, R. B. & W., new list.....dis 70&10
Stove, American Screw Co.'s.....dis 40
Bolt Ends 16c. per lb net....60

Bellows.

Dis

Blacksmith's com new list, 45 ₱ct
Moulder's new list, dis 25 ₱ cent
Hand, new list, 25 per cent

Butts.

Dis

Wrought brass.....65&10
Cast, loose joint.....55&10
Pin, loose.....50&10
Wrought, fast joint narrow.....45&10
Wrought fast joint broad.....45&10
Wrought loose joint broad.....55&10
Wrought table and back flaps.....45&10
Loose joint, without acorns.....55&10
Ten per cent. extra dis for cash.

Cleveland Stamped Elbows

Genuine Russia Iron

4 inch per doz.....4 50
4½ do do.....5 50
5 do do.....7 50
5½ do do.....8 50
do do.....9 50
do do.....11 00

Planished American Russia Iron

inch, per doz.....4 00
4½ do do.....5 00
do do.....6 50
5½ do do.....7 50
6 do do.....8 50
do do.....9 50

Charcoal Iron

4 inch, per doz.....2 00
4½ do do.....2 50
5 do do.....3 50
5½ do do.....4 00
do do.....4 50
do do.....5 50
25 per cent

Chisels.

Hot and cold cutting.....₱ lb 30
Railroad track.....30
Machinists.....30
Mallet head.....50
Tape.....50
Packing.....50
Stone cutters.....50

Crowbars.

Cast steel.....₱ lb 8¼
Iron, steel points.....6¼c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table..net
Am. Miller Bros.' Cutlery Co.....dis 25
Humason & Beckley, pocket 33⅓
Naugatuck Cutlery Co...list net
Aaron Berkenshaw's pocket dis 25

Coopers' Tools.

Bradley's.....dis15@20
Barton's.....dis15@20

Chains.

Coil by cask.....

3-16	¼	5-16	⅜	7-16	½
10⅛	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each...$2.50 dis 10
Blacksmiths', self-feeding, each 7.50 dis 20
Breast, P. S. & W.....dis 20&10

Drawing Knives.

Witherby's.....dis 65@10
Nobles Mfgr. Co.....15
Adjustable handle.....20

Emery and Emery Paper.

Regular Numbers.....₱ lb 6c
Flour and F. F.....₱ lb 4c
B. & A. Emery Paper..dis 30&5

Enameled and Tinned Ware.

Kettles.....dis 50
Sauce Pans.....dis 25
Tinned Sauce Pans.....dis 50

Files.

Auburn...$5 to £. dis 35 pr cent
E. M. Boynton's, new list..dis 25
J. & Riley Carr.....4.50 to £
Johnson & Bro.....dis 30
Butcher's.....4.50 to £
Walter Spencer & Co.'s "Diamond".....4.50 to £.
Fisher's.....4.75 to £
Moss & Gamble.....4.50 to £
H. Disston & Sons (new list).....dis 40 per cent
Heller Bros.' Horse Rasps dis 25
Nicholson.....dis 40
New American.....dis 40
Union File Co.....dis 40

Grindstones.

Ohio.....1¾@1⅞ ₱ lb
Nova Scotia.....1¼@1½ ₱ lb

Hammers.

Maydole's.....dis 15
Cheney's.....dis 25
Hartford Hammer Co.....dis 20
Humason & Beckley.....dis 50
Verree.....dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75, dis 25&10
Nelson Tool Works....dis 40&10
Warner & Noble's.....dis 5
Kip's.....dis 15
Yerkes & Plumb.....dis 15
Wilkinson's Smiths' 11½c ₱ lb net

Hatchets.

Yerkes & Plumb:--Shingling, Nos....1, 2, 3,
₱ doz $7 50, $8 00, $8 50, dis 25
Claw, Nos....1, 2, 3,
₱ doz $8 25, $8 75, $9 25, dis 25
Lathing, Nos....1, 2, 3,
₱ doz $7 50, $8 00, $8 50, dis 25

Nails.

10 to 60d.....$3 50
8 and 9d.....25
6 and 7d.....50
4 and 5d.....75
3d.....1 50
2d.....2 75
3d fine.....3 00
2d fine.....3 75
⅞ inch.....3 00
4d barrel.....1 00
1¼ inch barrel nails.....1 50
1½ do do do.....1 75
1 do do do.....2 50
⅞ do do do.....3 00
Cut spikes, all sizes.....35
Clinch nails, all sizes.....1 75
Casing and box nails.....75
Finishing nails.....$1 25
Tobacco nails.....50

Nuts and Washers

Nuts, square.....7c off list.
Nuts, hexagon.....6c. off list.
Washers.....6c off list.

Picks.

Railroad, 4 to 5 lbs...doz $7 75
5 to 6 lbs.....7 75
to 7 lbs.....8 50
7 to 8 lbs.....9 50
Railroad Tamping Pick 7 to 8 lbs..doz 13 50
Mill Picks per lb.....75c

Rivets.

Iron.....dis 40
Tinned.....dis 40
Copper.....dis 33⅓

Squares.

Dis

Steel or iron, case lots.....50
Try squares and T bevels.....40

Spikes—WROUGHT

All lengths by ¼ inch.....4½c
do do do 5-16.....3½
do do do ⅜, 7-16 & ½ in 3¼

Shovels and Spades.

Ames' new list, July 1, 1881.....dis 15
Old Colony.....dis 15
Remington's (Lowman's Patent).....dis 30
Rowland's.....dis 40 and 10
Griffiths.....dis 40&10

Saw Sets.

Boynton's patent X Cut, per doz $12; Hand Saw, per doz $10.....dis 20
Stillman's Genuine, per doz $3 50 and $5 50.....dis 20
Stillman's Imitation, per doz $3 25.....dis 20&10
Common Lever, per doz $2 dis 30&10
Leach's No. 0 $8; No. 1 $15; dis 15
Hammer, Hotchkiss $5 50, dis 10
" Bemis & Call Co.'s new patent.....dis 40&5
Bemis & Call Co.'s Lever and Spring Hammer..dis 30&5
Bemis & Call Co.'s Plate..dis 10
" " Cross-cut dis 12½
Aiken's Genuine...$13, dis 50&10
" Imitation.....$7, dis 50
Hart's Patent Lever.....dis 20
Disston's Circular.....dis 40

Sad Irons.

From 4 to 10 lbs....per lb 3¾ net
Self-Heating.....₱ doz $9 net
" Tailors ₱ doz $18 net
Gleason's Shield and Toilet.....dis 25
Mrs. Pott's Irons, double pointed.....dis 35
Mrs. Pott's Irons, square back.....dis 35
Enterprise Star Irons.....dis 35
Combined Fluter and Sad Iron.....₱ doz $15, dis 15

Scales.

Hatch, Counter, No. 171 ₱ doz. $42, dis 37½&10
Union Platform.....$6, dis 45
Fairbanks'.....dis 20
Buffalo Scale Co.....dis 20&5
Forsyth Scale Co.....dis 25
Howe's.....dis 20&10
Chatillon's Eureka.....dis 25
Family Universal.....dis 50
Scale Beams.....dis 33⅓&10

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Planes.

Ohio Tool Co.....dis 25
Sciota.....dis 30
Bailey's Pat. Adjstble..dis 20@25

Rules.

Stanley.....dis 66⅔ and 10

Sash Locks. Discount.

Payson Mnfg. Co. "Perfect"..42
Simmons' Sash Supporters....20

Hinges.

Champion double acting spring hinges.....dis. 30
Screw & Strap 8@12 in.....$6. net
Gravity Locking Blind Hinges, Sargeant & Co. 70&10

Screws. Dis

Flat head iron or steel per cent dis.....30
Flat head brass.....30
Round head iron or steel..25
Round head brass.....20
Brass and Silver capped..40
Japanned, list of Plain Screws.....20
Coach, patent Gimlet point, list per 100.....60
Lag, taper points.....60
Bed.....10
Machine, flat head, iron..55
round head, iron..50
Bench, iron.....55&10
wood, beech, per doz $3.....10
wood, hickory....20&10

Valves. Dis.

Jenkins' Patent Gate Valves..35
" " Globe "..40
" Standard Packing "..20

Wrenches.

Coe's genuine.....40 & 10
Girard Standard....dis 50 & 10
Mechanics' 10 and 10.....dis. 40

Wire.

Brass and Copper.....dis 30
Bright & annealed, Nos. 0 @ 18 dis 50@52½
" " Nos. 19 @ 26 dis 60
" Nos. 27 @ 36 dis 65
Coppered Nos. 0 @ 18, dis 45@47½
Galvanized, Nos. 0 @ 18, market list,.....dis 40@42½
Tinned, Nos. 0 @ 18,...dis 45@47½
Cast steel.....dis 40
Tinned Broom Wire, Nos. 18 @ 25.....dis 55
Annealed Fence, Nos. 8 and 9.....dis 55@52½
Annealed Grape, Nos. 10 to 14.....dis 50@52½
Galvanized Telegraph, Nos. 7 to 9.....₱ lb 7¼c
Galvanized Telegraph, Nos. 10 to 11.....₱ lb 8¼c
Galvanized Telegraph, No 12.....₱ lb 10½c
Fence staples.....₱ lb 5½@5¾c
Fence Staples, galvanized, ₱ lb 7@7¼c
Stubs Steel Wire...$6 00 to dis 30
Barb Wire, painted.....8½c
Barb Wire, galvanized.....9¼c
Crucible Steel Ropes from ¾ in. at 9c to 1¼ in. at.....52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at.....33c

Boiler Plates.

("Gaylord"--Standard Quality.)
C. No. 1.....4 50
C. H. No. 1 Sheil.....4 75
C. H. No. 1, 50,000.....5 25
C. H. No. 1, 55,000.....5 75
C. H. No. 1 Flange.....6 50
Firebox.....
T. S., 60,000.....(as per)..6 50
T. S., 65,000.....(act of)..
Homo. Steel, 70,000 (of Cong).7 50
Heads, ¼c ₱ lb. extra.
N.B.—Eastern brands of boiler plate at from 2-10 to 3-10c ₱ lb less than above prices.

Sheet and Tank Rivets, "Norway."

All sizes.....dis. 15

Boiler Rivets—" Albany."

½, ⅝, 11-16, and ¾ in. diam.5 50

Boiler Makers' Tools.

Doty's Power Shears...net list
" Hand Lever Shears.net list
" Power Punch.....net list
" Hand Punch.....net list
Steel Screw Punch.....net list
Iron Screw Punch.....net list
Boiler Plate Rolls.....net list
Buffalo Forges & Blowers dis 20
Watson's " " net list
Spring Tube Expander....dis 15
Roller Tube Expander..net list
National Tube Cleaner...dis 20
Wire Flue Brushes.....net list
Anvils—"PeterWright" 12½ ₱ lb
Solid Box Vises.....net list

Nuts, Bolts, etc.

Square & Hex. Nuts....7 off list
Washers.....6c. off list
Machine Bolts.....dis 65
Bolt Ends.....dis 60
Boiler Patch Bolts.....net list

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch.....dis 25
"National" Special Locomotive Tubes.....net list

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch.....2 50
4½ to 6 by ⅜ to 1 inch.....2 60
1¾ to 6 by 1¼ to 1½ inch....2 90
1¾ &1½ by ⅜ to ½.....2 60
1 & 1¼ by ⅜ to ½.....2 70
⅝ ½ and ⅞ by ⅜ to ½.....2 90

Round.

1 to 1⅜ inch.....2 50
2 to 2⅝.....2 70
2⅝ to 3¼.....3 00
3¾ to 4.....3 50
4¼ to 4½.....4 00
4¾ to 5.....4 20

Square.

1 to 1⅜ inch.....2 50
2 to 2⅝.....2 70
2⅝ to 3¼.....3 00
3¾ to 4.....3 50
⅝ to ⅞.....2 60

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch. 2 70
1 to 1¼ by ¼ and 5-16 do 2 80
½ to ⅞ by ¼ and 5-16 do 3 00
⅝ to ⅛ by ¼ and 5-16 do 3 50

Half Oval and Half Round.

Wagon box iron ½ and ⅝....4 00
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ⅛ to 3-16.....3 00

Hoops.

1¼ to 2, Nos 16 to 18.....3 40
1¼ to 4 do 13 to 15.....3 30
1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24.....4 50
No 25 to 26.....4 70
No 27.....4 90
No 28.....5 30

English Steel.

Best cast.....₱ lb 15½c
Extra cast.....16½c
Round machinery, cast.....10c
Swaged, cast.....18c
Best double shear.....15½c
Blister, 1st quality.....13c
Refined tool steel.....16½c
Spring calking.....7¼@7½c
German steel, best.....11c
2d quality.....10c
3d quality.....9c
Sheet cast steel, 1st quality.....15½c
2d quality.....14½c
3d quality.....12¾c

American Steel.

Best brands of refined cast steel, ¾ to 2 inches....12c
Crucible cast.....7c
Open-hearth ditto.....4½c
Hammer cast steel.....9c
Spring cast steel.....7½c
Bessemer and open-hearth spring.....5c
Ditto plow.....4½c
Steel boiler plate.....6½@7c
Bessemer machinery...5 @6c
Spring and calking.....7¼@7¾c
Tire.....5
Sleigh shoe.....5

Bessemer Steel Tire.

¾ to 1 by 3-32.....4½ ₱ lb
¾ to 1 by ⅛ to 5-32.....4½ ₱ lb
¾ to 1 by 3-16 to ⅝.....4½ ₱ lb

Miscellaneous Cast Steel.

Auger and auger bit.....1
Axle steel for wagons.....7
Frog points and plates.....8
Frog size bars.....8½
Pick, hammered.....10
Mattock, beveled.....9
Table cutlery.....7½
Trap spring steel.....10
Pike and cant hook.....9
Coal and granite.....8½

TINNER'S STOCK.

Tin.

Banca.....per lb. 26c
Straits....." 26c
English....." 27c
Bar....." 27c

Tin Plate,

IC 12x12 charcoal.....$ 6 50
IC 14x20 do.....6 25@6 50
IX 14x20 do.....8 25
DC 12½x17 do.....6 00
DX 12½x17 do.....8 00
DXX, 12½x17 do.....10 00
DXXX, 12½x17 do.....12 00
IC, 20x28 do.....14 50
IX, 20x28 do.....15 50
IC, 14x20, Best Roof.....6 00
IX, 14x20, do.....8 00
IC, 20x28 do.....13 00
IX, 20x28 do.....14 50
IC, 10x14 Best Coke.....5 75

Solder.

Half and Half, in bars.....15⅝
No. 1 do.....14⅜
Spelter Solder.....25

Pat Planished Sheet Iron.

[A].....per lb 10¼c
[B].....9¾c

Nos	10	15	21	25
	to 14	20	24 & 26	
Com	3-60	3-80	4-00	4-20
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra

Zinc.

Sheet, cask.....8c
Sheet, open.....8@ 8½

Cutlery.

Meriden Cutlery Co., (Table).....net
Am. Miller Bro's Cutlery Company.....dis. 25
Humason & Beckley, Pocket.....dis. 33⅓
Naugatuck Cut. Co.....list net
Aaron Burkinshaw's poc..dis.25

Tinners' Tools & Machines.

Machines (P. S. & W.) list add 20
Tools (P. S. & W.).....add 6

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe.....dis 65.
Malleable Iron Fittings..dis 10
Grey Iron Fittings.....dis 50
Steam Brass Goods.....dis 50
Water " " .....dis 40
Ludlow Gate Valves.....dis. 20
Register Gauge Cocks net 100
Montg'ry Gauge Cocks..$1 each
Steam Gauges.....dis. 40
Steam Guages 5 in. net dial per doz.....30 00
Scotch Glass Tubes.....dis. 60
Tools.....special.
Duplex Injectors.....net.
Soil Pipe & Fittings, Mott's List.....dis. 20
Sinks, Mott's List.....dis. 25
Copper Bath tubs, sinks, etc.....dis. 20
Galvanized Iron Boilers "Scaifes."".....dis. 45
Marble Slabs, Counter-sunk net per ft.....$ 1 25

Babbitt Metal.

Babbit Metal, No. 3. 14 X.....42
Babbit Metal, No-2, 16 XX.....46
Babbit Metal, No. 1, 18 XXX..50
C. 20
B. 24.....dis. 40 per cent.
A. 32

LEAD.

American, ₱ lb.....5c
Bar, ₱ lb 6½c dis 10 per ct
Pipe, ₱ lb 7½c dis 10 per ct
Sheet, ₱ lb..8c dis 10 per ct
Tin-lined pipe ₱ lb 15c dis 10 per ct
Block.....45c.
Chilled Shot.....8c

COPPER.

Lake Ingot.....18 @18¼c
Baltimore.....17½@17⅝c
Arizona.....17⅜@17½c

Sheathing Braziers Copper, Bolts, &c.

Brazier's Copper, ordinary sizes, 16 oz. per sq foot, and over per lb.....30c
Brazier's Copper, ordinary sizes, under 16 oz. and over 12 oz. per sq foot, per lb. 32c
Brazier's Copper, 10 oz and 12 oz. per sq. ft...per lb. 34c
Brazier's Copper lighter than 10 oz. per sq. ft...per lb. 36c
Circles less than 84 inches in diameter per lb. 33c
Circles 84 inches in diameter and over.....per lb. 30c
Segment and Pattern sheets per lb. 33c
Locomotive Fire Box sheets per lb. 30c
Sheathing Copper, over 12 oz. per sq. ft.....per lb. 28c
Bolt Copper.....per lb. 30c
Copper Bottoms..per lb. 31@32c
No copper is Sheathing except 14x10 inches, and not to exceed 34 oz. to the sq. ft.

Tinning.

14x18.....per sheet 6c
All other size sheets, 2½c per square foot For tinning both sides, double the above amount.

SCRAP IRON AND OLD METAL

DEALER'S SELLING PRICES.

	Net Tons.
No. 1 wrought scrap	$24
Sheet and hoop "	10@11
Cast scrap, (No. 1 heavy)	19
Cast Scrap (Stove Plate)	12

OLD METALS.

Old copper per lb	15c
No. 1 H. Brass per lb	14
Heavy yellow Brass do	12
Light Brass per lb	8
Scrap Zinc per lb	3½
Tea Lead per lb	4
Heavy Lead per lb	3

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas

Inside Diameter Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛..	08		.40	24
¼..	08	$0 11	.54	.42
⅜..	09	12	.67	.56
½..	11	15	.84	.85
¾..	13½	19	1.05	1.13
1...	19	28	1.31	1.67
1¼..	27	40	1.66	2.26
1½..	33	47	1.90	2.69
2...	46	64	2.37	3.66
2½..	75	1 00	2.87	5.77
3...	95	1 30	3.50	7.55
3½..	1 25	1 70	4 00	9 05
4...	1 50	2 05	4.50	10.73
4½..	1 75	2 40	5.00	12 49
5...	2 25	3 00	5.56	14.56
6...	2 75	4 00	6.62	18.76
7...	3 75	....	7.62	23.00
8...	4 75	....	8.62	28.00
9...	6 50	....	9.68	34.40
10..	8 00	....	10.75	40.64
12..	12 00	....		54.65

Discount, 65 per cent.

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Brass.

All Nos not thinner than No. 28, wider than 2 in. not wider than 14 inch.....30c
All Nos to No. 28, inclusive, and widths over 14 to 20 in. inclusive.....35c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive.....38c
½c per lb. advance on each No above Nos. 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at.....53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches.37c

Low Brass.

4c per lb. more than High Brass.
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal
In Bars.....48c
Sawed.....51c
Planed or Polished...54c

For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c per lb. advance
Metal, in width ⅛ in. to ¼ in. thinner than No. 28, 5c per lb. advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths, add 7c per pound.

COAL,

WHOLESALE.

Wholesale f.o.b. vessel at Cleveland:

Carbon Hill and Monday Creek	$2 65
Massillon	3 00
Brier Hill	3 25@3 75
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 25

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 75
Carbon Hill and Monday Creek, nut	3 50

75c less on cars by car load.

Anthracite Stove and Chestnut	7 00@7 25
Egg and grate	6 00

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	21 25
30x50	22 50
30x52 to 30x54	23 25
30x56 to 34x56	25 00
34x58 to 34x60	27 75
36x60 to 40x60	30 00

Dis 60 & 15 single, 60 & 20 double

OILS.

Pure Oils. packages included	
Sperm, winter bleached per gal	1 25
Whale, winter bleached per gal	63
Straits	50@53
"A" oil for tanner's use	35 @40
Lard oil extra W S	97
do No 1 do	76
do No 2 do	67
Tallow oil	74
Neatsfoot oil pure	90@95
do No 1	80@85
Linseed oil, raw	52
do do boiled	55
Cotton seed oil white	64 @ 66
do do yellow	60 @ 63
West Virginia lubricating 28 deg	20c@30c
Pure Mecca	55@ 50
Paraffine oil winter pressed	25@ 30
Machinery	40
Engine	50
Miners' oil	40@45
Drilling oil	40

Hides and Leather.

Prime cured hides	8½@8¾
Green hides	6@6½
Bull, scrubby, badly scored or damaged, cured, two-thirds price.	
Prime dry hides	13@14
Horse hides, green	$1 75@2 00
Prime cured veal calf	13
Ohio Deacon S, salted	65@70
Pelts, wool on	22@34
Fresh slaughter sheep	30@$1 50
Prime cured calf skins	13
Hemlock rough	23@34
Oak harness	34@38
Oak rough	25
Union harness	32@35

Cleveland Business Directory.

Assayers and Analytical Chemists.

JUDSON, W, E, Ana ytical Chemist, 8 Cushing Block.

Bolt and Nut Works.

HOTCHKISS & GAYLORD, manuf'rs. Machine, Plow & Elevator Bolts, Coach Screws.

Boiler Makers.

SMITH & TEACHOUT—(Established 1857.) Boiler, Tanks, Stills etc. 489 Broadway.

Bridge Builders.

BUCKEYE BRIDGE AND BOILER WORKS mfrs of Arch & Truss Bridges, Boiler Tanks and Oil Stills. Bet. Wasson St. and Case Ave.

Coal and Iron Exchange.

JACKSON IRON CO. Iron Ore and Pig Iron. Rooms 8 and 9. Fayette Brown, Gen. Agent.

RHODES & CO. Coal, Iron Ore an Pig Iron. Rooms 1 and 2.

Carriage Blacksmith.

STRIEBEL, CHAS. manfac'r. of Carriages and Wagons and platform trucks. Horse shoeing and general blacksmithing .93 Woodland ave.

Carriage Bolts.

THE COLWELL & COLLINS NORWAY BOLT CO., manufacturers of Philadelphia Carriage and Tire Bolts.

Church and School Furnture.

FAULHABER, GEO. manufacturer of School and Church Furniture. Fine Hard Wood work a specialty. 203 Ontario Street.

Custom Boots and Shoes.

ROONEY, JOHN manufacturer of hand-made Boots & Shoes, custom made and warranted 177 Ontario Street.

Carriage Repository.

GREENE'S, J. O., Carriage Repository, 408 Superior street and 52, 54 & 56 Rockwell street, dealer in Fine Carriages. Repair shop in connection.

Coal and Pig Iron.

ANDREWS, HITCHCOCK & CO., Briar Hill Coal and Pig Iron. 122 Water Street.

Electrical,

ELECTRIC SUPPLY CO. manfrs and dealers in Electric Burglar Alarms, Annunciators, Cell Bells and Batteries. Telephone lines built and repaired. 145 Seneca Street.

Fresco Artists.

KEMMER & KUSHMAN DECORATIVE CO., Fresco Artists, Fine Modern Wall Papers. 338 Euclid ave.

Foundries.

BOWLER & CO., Car Wheels, Patent Chilled Frogs, and all kinds of castings. 9 Winter.

CLEVELAND MALLEABLE IRON CO., manufacturers Malleable Iron Castins.

LAKE SHORE FOUNDRY, Water and Gas Pipe, Light and Heavy Castings. Alabama st.

TAYLOR & BOGGIS, successors to H. & H. F. Taylor, Iron Founders, 65 to 73 Central Way.

FITZSIMONS WM. & SON, Rolling Mill and Machinery castings. Rolls a Specialty. No. 435 Broadway.

File and Saw Works.

PARKIN, W. H. & CO., Hand-cut Files and Rasps, dealers in Disston's saws, 11 So. Water

Flue Cleaner.

CLEVELAND FLUE CLEANER M'F'G. CO. manufacturer of Aitchison & Doolittle's Patent Steam Flue Cleaner, 22 & 24 Power Block.

Hotels.

FOREST CITY HOUSE, cor. Public Square and Superior st., Terrill & Ingersoll, Props.

KENNARD HOUSE, D. McClasky, Prop.

NEW ENGLAND HOTEL, Water st., W. W. Wolcott, Prop. Refitted and refurnished.

STRIEBINGER HOUSE, between Ontario and Seneca sts. $2.00 per day. Hawley & Langton

CITY HOTEL, Seneca street. H. B. West, proprietor. $1.50 per day.

Hides, Pelts and Leather.

DENNISON BROS., dealers in Hides, Pelts, Furs and Tallow. 48 and 50 River street.

Hardwood Lumber.

MARTIN, J. T. dealer in Hardwood Lumber, Stone's Levee, near Central Way.

Lumber.

WOODS, PERRY & CO., manufacturers and dealers in Lumber, Lath, etc., 5 Carter st.

FISHER, WILSON & CO., wholesale lumber dealers (pine & hard wood), rough and dressed umber, timber, lath shingles, etc. 47 Central Way

KRAUSE, C. A., & SON, wholesale and retail dealers in lumber. Yards cor. Superior and Wason and 281 Merwin streets.

Oil Manufacturers.

AMERICAN LUBRICATING OIL CO., manufacturers of lubricating oils, 22 Euclid ave.

Cleveland Business Directory.

Hardware and Iron.

BINGHAM, WM. & CO., Hardware, Iron, Nails and Metals, 148 and 150 Water street.

CLEVELAND ROLLING MILL CO., manuf'rs. of Steel and Iron Wire and Steel Tire.

WORTHINGTON, GEO. & CO., Hardware and Dealers in Metals. Water street.

Lime Manufacturers.

RUSSELL LIME CO., manufacturers of White Lime; also dealers in Plaster, Cement, etc. 85 Elm street.

Machinery and Boilers.

CLEVELAND STEAM FURNACE CO., Engines and Boilers, cor. Detroit and Center sts.

KRITCH, K. E. Metal Pattern Maker. Small machinery repaired. Lawn Mower sharpening a specialty. 42 South Water Street.

Machinery Depot.

CLEVELAND MACHINERY DEPOT, (now National Machinery Depot.) The largest stock of New and Second-hand Engines, Boilers and Machinists' Tools. Shop and Warehouse corner Bond and Superior streets.

Mercantile Agency.

THE MERCANTILE AGENCY. R. G. Dun & Co. proprietors. 121 Superior street.

Pattern and Model Makers.

WHITTINGHAM, J. & C., Metal Pattern and Model makers. 52 Canal Street.

REID, J. C., Pattern and Model Maker. 52 Canal Street., (Up Stairs.)

COTTRELL & CO., W. L., Pattern Makers, 53 Center street.

STAIR BUILDER.

PFEIL, CHAS, Stair Builder; Hard Wood Mantles and Office Railing. Works, 49 & 51 Canal street, Cleveland, Ohio.

Steel Stamps and Stencils.

FLEHARTY, J. H. & CO., Rubber Stamps, Seals, Stencils. 197 Superior street.

Steam Furnaces.

CUYAHOGA STEAM FURNACE CO., Manfrs of Land and Marine Engines. Machinery for Blast Furnaces, Rolling Mills, Bessemer Steel Works, &c. Mill-Gearing and all kinds of Castings, Foundry, Machine and Boiler Shops.

Trunks and Valices.

FABER, J. manuf. Trunk, Traveling Bags and Ladies' Fine Satchels. Sample Trunks and Cases a Specialty. 56 Public Square.

Vessel Agents.

WEBB, H. J. & CO., Ship Brokers and Vessel agents, 17 & 18 Board of Trade Building. 122 Water Street.

Wood Carving.

HERKOMMER, J., Carver and Ornamenter in Composition. 225 Erie street.

Business Directory.

Akron, O.

AKRON IRON CO., manufacture best Common, Refined and Charcoal Iron.

CASCADE HOUSE, cor. Mill and Summit sts., near Depot. J. Downie, Prop.

MCNEIL, J. C., Steam Boilers, Heavy Sheet Iron Work. Repairing promptly executed.

PERKINS, C. E., dealer in Agricultural Implements, machinery, and Manufacturers' Ag'nt

TAPLIN, RICE & CO., manuf'rs. of Stoves and Hollow Ware, dealers in Tinners' Stock, etc.

WEBSTER, CAMP & LANE MACHINE CO., Founders and Machinists, 12 Main street.

AKRON POLISHING & PLATING WORKS. Man'f'rs of solid leather wheels for polishers.

Alliance, O.

MCFARLAND, J. W. Engine and Machine Builder, and General Machine Jobbing.

Buffalo, N. Y.

SANDS, PAUL, Marine and Stationary Steam Engine Works mfr. of drilling mac ines, foot and power lathes. 70 Columbia street.

EMPIRE STATE MF'G CO., O. F. Swift, prop'r. manfr of Fluters, Sad Irons, Spun Copper & Half Copper Tea Kettles. Washington, cor. Ohio

WHITE, L. & I, J. manf'r's of Coopers' Tools. Carpenters' Tools, and Ship Tools Also manf'r's of Planer Knives and Machine Cutters to order 310, 312, 314 Exchange street.

THE BUFFALO NUT AND BOLT CO [Limited.] Manufrs. of Hot Pressed Nuts, Bolts, Washers, Rivets, &c. No. 226 Ohio Street.

Cuyahoga Falls, O.

THOMAS BROTHERS, manfrs of Ohio Stone Ware. Cuyahoga Falls Stone Ware Factory, cor. Main and Broad streets,

TURNER, VAUGHN & TAYLOR, manufacture engines, presses and grinding machinery for clay; also paper, chain, wire and flour mill machinery. Send for Circulars and price list.

SNYDER, H. wholesale manu acturer of Sash, Doors, Blinds, &c. Send for Price Lists.

THE CUYAHOGA FORGE AND IRON CO., manfrs. of every description Car, Truck and Driving Axles, Forging, Shafting, &c.

Wheeling, W. Va.

EXCELSIOR MACHINE WORKS, Redman & Co., general machinists and manufacturers of Marine and Stationary Engines, Hangers, Pulleys, Shafting, &c. Cor. 18th & Chapline streets.

Business Directory.

Canal Dover, O.

HECKMAN, E., manufr. and dealer in harness leather, upper, kipp and calf. Also, manufacturer & dealer in prime English Dairy cheese. Highest market cash price paid for hides.

Columbus, O.

PAT. ADJUSTABLE WINDOW CURTAIN Cornice, manufactured by Strader's Curtain Cornice Works.

ROYCE & PULLING manufrs of Patent Steam Pumps for all purposes. Store room 30 High street. Works Nos. 5 and 7 Scioto street.

U. S. CARRIAGE CO. builders of fine Carriages, Buggies and Phætons. Salesrooms and Office 257, 259 and 261 Fourth street.

REYNOLDS BROS., manufacturers of hand-cut Files and Rasps. Old files re-cut. Send for Price List.

CITY BOILER WORKS, manfrs of Stationary, Portable and Locomotive Steam Boilers. All work warranted. Borger Bros. & Co.

MURRAY, HAYDEN & CO., manfrs of Malleable Iron. Cor. Randolph & West streets.

Canton, O.

DIEBOLD SAFE & LOCK CO., manuf'rs. Safes, Locks, Bank and Safe Deposit Works.

NOVELTY IRON WORKS, Mill work, Shafting, engines, Imperial job printing press, etc

NEW AMERICAN HOUSE, Canton. Fred. Hipp, Prop.

Erie, Pa.

GUNNISON, A. B., wholesale manufacturer of Wood Pumps. 233 East Twenty-Second St.

BALL ENGINE CO., limited, manufacturers of Automatic Engines of 15 to 30 horse power

NOBLE SEWING MACHINE CO. manfrs of the New Noble Sewing Machine. Send for circulars and prices.

A. B. FELGEMAKER & CO. Church Organ builders. Descriptive catalogue furnished on application.

Geneva, O.

THE ENTERPRISE MACHINE CO., L. L. Crane, Pres't, manfrs of Machinists' Tools and Machinery. Gear Cutting a specialty.

Lima, O.

LIMA HOUSE, centrally located; telegraph office in the house. J. Goldsmith, Prop.

Meadville, Pa.

CURRY & CO. general jobbers in Castings of al kinds.

Niles, O.

Reeves Brothers, Manufacturers of Boiler and Tank Iron, etc.

Olean, N. Y.

MYRICK BROS. & CO., manufact'rs Engines and Boilers, oil drilling tools, rig irons, etc.

Oil City, Pa.

REID, JOS. Machinist, steam engine and pump repairing. Brass and iron castings, light and heavy, made on short notice.

Pittsburgh, Pa.

PRINTING PRESSES. W. A. Bunting, manufacturers' agent. Printers supplies, type, cards. 42¾ Sixth Street. [Up stairs.]

BAIR & GAZZAM, practical machinists; gear cutting a specialty. Rice's Feed Water and Heater. 17 Wood street, corner First Avenue.

Painesville, O.

NORTH AMERICAN CUTLERY CO., m'fr's of Steel Shears and Scissors—best quality.

Ravenna, O.

THOMPSON, T. F., dealer in Agricultural Implements, farm machinery, hardware, seeds, fertilizers, &c. Cor. Main and Prospect sts.

BALDWIN, D. L. & SON, Contractors & Builders and manfrs of all kinds of Moulding, flooring, siding, &c. Rip, Band and Scroll Sawing.

Rheims, N. Y.

GREAT WESTERN CHAMPAGNE. Finest made in America. Equal to best imported. Has taken highest awards everywhere, and is used all over the Continent. Try a case, and you will have no other. Pleasant Valley Wine Co., Rheims, N. Y.

Rochester, N. Y.

GOWE, JNO. N., mfrs. of Specialties, such as Machine forging, bridge bolts and trusses, railroad switches, spike, mail, chisels, &c.

ELEVATORS for Hotels, Factories and Private Houses. J. S. GRAHAM & CO.

WOOD-WORKING MACHINERY. Send for Catalogue. J. S. GRAHAM & CO.

RAZOR STROPS. Sole mfrs. of all kinds of Razor Strops. Utscht, Linn & Co. 131 N. Water

Steubenville, O.

DORRANCE, D. W., Tool Works, manufacturer of hand-made miners' and stone-cutters' Tools. Promp attention given to mail orders.

Sandusky, O.

SANDUSKY WHEEL CO. manfrs. of Sarven Patent Wheels, Carriage Bodies and Seats, Plain Wood Hub Wheels, Banded Hub Wheels, Jacob's Patent Neck Yokes.

Business Directory.

Sandy Lake, Pa.

EBERMANN, W. S. & SONS, manfrs. of the celebrated Ebermann Boiler Feeder. Send for Circulars and Price List.

Titusville, Pa.

FOSTER & MCKAY, dealers in boilers and engines, tubing, casing, old iron, rope, and all kinds of metals. Washington street, nr. Railroad.

Toledo, O.

BAKER, HERBERT, Machine Shop and Iron Foundry. 98 and 100 Erie street.

TOLEDO FOUNDRY AND MACHINE CO. builders of Steam Engines, Circular Saw Mills and all kinds machinery. Water St., cor. Cherry

RUSSELL IRON WORKS, mnfrs. of Architectural Iron Work, castings, pulleys, shafting and steam bending machinery. Cor. Water and Lagrange streets.

STANDARD SAW WORKS, H. Bartley, manufacturer and dealer in Saws of every description. All kinds of Springs made from Sheet Steel. Reaper, Hay Knives Truss Springs, &c. made to order. 92 St. Clair Street.

UNION Wooden Ware Manufacturing Co. manufacture Sewing machines, washboards, children's wagons, carts, wheelbarrows, sleds, kitchen wooden ware, &c.

HEPBURN BROTHERS, proprie. Union Boat Works. Boats of all kinds made to order. For sale or rent. Water Street foot of Cherry.

Union City, Ind.

LAMBERT, J. W. & CO., mfrs of fork, rake, hoe and broom handles; spokes, hubs, whiffletrees, yokes, plow-rounds, &c. Correspondence solicited.

Youngstown, O.

BELL, EDWIN & SON, manuf. of Nail Kegs, Pat. coiled hoops, slack barrel and keg heading and oil barrel stock.

DINGLEDY, G. H. dealer in rough and dressed Lumber, Shingles and Lath.

MORTON HOUSE, formerly Maitland House, James Morton, Prop.

TOD HOUSE, cor. Diamond and Market streets, Henkel & Bowman, Props.

Zanesville, O.

KIRK HOUSE, William Kirk, proprietor. $1.50 per day.

Brattleboro', Vt,

A JOY FOREVER!

ESTEY ORGANS

Manufactured by

J. ESTEY & CO.,

Brattleboro', Vt.

(Catalogue free on application.)

CLEVELAND NON-CONDUCTING CO.

MANUFACTURERS & DEALERS IN

ASBESTOS, HAIR FELT, CEMENT, & OTHER

Pipe Coverings,

19 SOUTH WATER STREET, LAND, OHIO.

Smith & Curtiss,

JOBBERS OF

TEAS,

COFFEES AND SPICES

ALSO PROPRIETORS OF THE CLEVELAND

Coffee and Spice Mills,

107 & 109 Bank Street,

Cleveland, O.

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Boston & AtlanticEx.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accommodation	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and Boston Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accommodation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m

TRAINS GOING WEST.	Arrive. From East.	Depart. From west.
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chicago Ex. via Sandusky	†6 35 a m	7 00 a m
Mich. Accom. via Norwalk	.....	†6 40 a m
Conneaut Accommodation	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex. via Sandusky	*1 40 p m	*2 05 p m
Chi. Pac. Ex. via Norwalk	*7 05 p m	*7 35 p m
Pt.Clinton Accommodation	.....	†5 00 p m

Sunday trains for Nottingham—Depart 9:00 a m m, and 2:15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev Accom.	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No 6 Indianapolis & Columbus Exp.	10 20
No 4 Columbus & Cincinnati Exp.	*3 40
No. 10 Wheeling Express	7 15

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap. & Wheel'g Ex.	7 10
No. 3 Special St. Louis & Cincinnati Ex**	1 55 P.M
No. 5 Night Express,	*7 25
No. 7 C.T.V. & W. & Col. Accom	4 00

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	8 25 P.M
Uhrichsville Express	10 30 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 15 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.	a.m.	a.m.	p.m.	p.m.
Through from East	6 50	.....	.....	*7 00
N.Y. P. & O. (Mahoning)	10 55	.....	2 00	*7 00
Pittsburgh Express	.....	.....	2 00	*7 00
Pittsb'g& Youngs'tn Ac	10 55	.....	.....	10 15
DEPARTURES.	a.m.	a.m.	p.m.	p.m.
Through Eastern Train	*7 10	.....	.....	10 45
N. Y. P. & O.(Mahoning)	.....	.....	.....	4 25
Youngs'tn & Pitts'bg Ac	.....	11 00	.....	.....
Pittsburgh Express	.....	*7 10	*2 30	.....

Cleveland & Pittsburgh.

	ARRIVE.	DEPART
Pittsburg & Wheeling	1 45 P.M	8 50 A.M
Express	6 55	2 30 P.M
Alliance Accommodation	10 15 A.M	3 45
Ravenna Accommodation	8 35	5 35
Night Express	6 30 A.M	†11 40 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

ARRIVE.		DEPARTUPES.	
No. 2 Accom.	10 15 A.M	No. 1 Mail	8 15 A.M
No. 6 Express	1 35 P.M	No. 3 Accom.	2 30 P.M
No. 4 Mail	6 30 P.M	No. 5 Exp.	6 05

Special trains leave on Sunday at 8.25 A. M. and 4.20 P. M., arriving at Cleveland at 10 A. M. and 6.25 P. M.

Trains leave from Depot foot of South Water Street.

Connotton Valley Railway.

Arrive.		Depart.	
No. 1	10 05 A.M	No. 4	9 15 A.M
No. 3	6 40 P.M	No. 2	4 05 P.M

All trains arrive and leave depot corner Commercial and Fifth Streets.

Cleveland, Akron & Columbus Railroad,

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Railroad to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	1 15 P.M	8 00 A.M
Express	7 25	1 50 P.M
Accommodation	10 10 A.M	3 45 P.M

CLEVELAND & PITTSBURGH

RAILROAD.

Trains leave Cleveland and arrive at the points named below as follows: Night Express runs daily, all other trains dail except Sundays.

	Mail.	Fast Line.	Accom.	Night Expr'ss.
Leave Cleveland	8 50 am	2 30 pm	3 45 pm	11 40 pm
Arrive Hudson	10 00	3 28	4 50	12 50 am
Ravenna	10 40	3 53	5 50	1 18
Alliance	11 25	4 25	6 05 pm	2 05
N. Philadel	11 35 pm	7 15	.....	10 55
Salem	12 25	.....	.....	3 02
Canton	12 28	5 47	.....	3 20
Massillon via Alliance	12 50	6 06	.....	3 38
Akron	10 42 am	4 10	5 40 pm	.....
Pittsburgh	3 30 pm	7 45	.....	6 55
Wheeling	5 10	8 00	.....	8 55
Marietta	8 45	.....	.....	.....
Harrisburg	.....	4 15 am	.....	4 00 pm
Philadelphia	.....	7 50	.....	7 35
New York	.....	11 15	.....	10 35
Baltimore	.....	7 55	.....	7 20
Washington	.....	9 17	.....	8 47
Boston,	.....	8 00 pm	.....	.....

Ravenna Accommodation leaves Cleveland at 5:30 p m, reaching Ravenna at 7:15 p m; Akron 2:3 p.m.

Newburgh Accommodations leave Cleveland at 11:00 a m and 12:30 pm. Returning, leave Newburgh at 11:10 am and 1:30 pm.

Passengers for New York, Philadelphia, Baltimore, Washington, and all points east of Pittsburgh make but one chang of cars, viz. at Union Depot, Pittsburgh, excepting those leaving on the Fast Line which has Pullman Sleepers from Cleveland to Philadelphia and New York.

The Fast Line leaving at 2:30 P. M. has elegant Pullman Palace Sleeping Cars through from Cleveland to New York without change. Pittsburgh Passengers who desire Parlor Car accommodations can secure seats in this car.

The Night Express has Pullman Sleeping Cars from Cleveland to Pittsburgh which can be occupied by passengers at Union Depot, Cleveland, any time after 9:00 P. M. At Pittsburgh passengers can take elegant through Parlor or Sleeping Cars for the East.

Sleeping and Parlor Car accommodations from Cleveland and Pittsburgh eastward can be secured at the Union Sleeping and Parlor Car Office Union Passenger Depot; of H. C. Marshall, Union Ticket Office, Weddell House; or of the Ticket Agent at the Euclid Avenue Station.

Through tickets can also be secured at the same points. Baggage checked through from the Union Depot or from Euclid Avenue Station.

By the 8:50 A. M. train a through car leaves daily for Akron, Gambier, Mt. Vernon, Columbus and immediate points, without change.

The 2:30 P. M. train has through car for Akron, Orrville, Columbus and immediate points, arriving in Columbus at 9:25 P. M.

By the 3:45 P. M. Accommodation train cars run through without change from Cleveland to Cuyahoga Falls, Akron and Millersburgh.

Night Express leaving Cleveland at 11:40 P. M., runs daily, and makes connection at Wellsville for Steubenville, Bridgeport, Wheeling, Bellaire and intermediate points. Every night in the week except Saturday the night express runs via Wellsville. On Saturday nights it runs via Alliance. All other trains run daily except Sunday.

Trains arrive at Cleveland.—Night Express at 6:30 P. M., having Pullman Sleeper from Pittsburgh; Ravenna Accommodation, 8:35 A. M., Alliance Accommodation, 10:15 A. M.; New York Wheeling & Washington Mail, with Pullman Sleeping Car from New York and Philadelphia, 1:45 P. M.; New York, Philadelphia & Wheeling Express, 6:55 P. M.

WM. A. BALDWIN, General Manager. **E. A. FORD,** Gen'l Pass. & Tkt. Agt. Pittsburgh, Pa.

C. L. KIMBALL, District Passenger Agent, corner Bank and St. Clair streets, Cleveland.

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad.]

For New York, Boston and the East. The shortest and quickest route to Pittsburgh, Washington, Baltimore and the Southeast

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:10A.M. LIGHTNING EXPRESS, (daily,) sleeping and hotel coaches from Leavittsburg. 8:55 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p.m.; Buffalo, 6:15 p.m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p.m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

10:45 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsburg to New York without change. Arrives at Youngstown 1:45 a.m.; Meadville, 3:50 a.m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a.m.; Rochester, 1:10 p.m.; Hornellsville, 11:20 a.m.; Corning, 12:53 p.m.; Elmira, 1:21 p.m.; Binghampton, 2:50 p.m.; New York, 9:25 p.m.

2:30 P.M. PITTSBURGH EXPRESS,—daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m; via Sharon and Meadville, 7:00 p. m.

4:25 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p.m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:10 A.M. PITTSBURGH EXPRESS,—(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p.m. and 4:20 p.m.

11:00 A.M. YOUNGSTOWN & PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:50 a.m., 7:00 p.m., 10:55 a. m 2:00 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the Union Ticket Office, corner Bank and Superior streets; at office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK, Gen. Pass'r. Agt., Cleveland, Ohio.

J. M. FERRIS, Gen. Man'gr. Cleveland. M. L. FOUTS, Pass. Agt., 131 Bank st., Cleveland.

NOTICE.—Hereafter all Passes must be returned to the General Passenger Agent within FIVE DAYS after date of expiration; otherwise they will be discontinued.

Blue Grass Route of Ohio

TIME TABLE.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS.

STATIONS.	Accom	Accom	Expr	Mail	Sundays only
Leave.	P. M.	P. M.	P. M	A.M.	P. M.
Cleveland	5.30	3.45	2.30	8.50	.....
Hudson	6 53	5.02	3 35	10.10	4 20
Cuyahoga Falls	7.11	5.30	3.53	10.29	4 40
Akron	7 23	5.46	4.10	10.42	5 00
*North Portage	P.M.	6.00	4 24	10.54*	6 14
Clinton	.....	6 19	4.44	11.09	5 31
Warwick	.....	6 29	4.49	11.14	5.37
*Marshallville	.....	6.43	5.02	11.27*	5.50
Orrville	.....	6 58	5.14	11.42	6 02
*Apple Creek	.....	7.17	5 32	11.58*	6 22
Fredricksburg	.....	7.32	5.45	12.11	6 37
*Holmesville	Accom	7.43	5 55	12.21*	6 48
Millersburg	7.55	6.08	12.34		7 00
	A. M.	P.M.			A.M.
Millersburg	5.50	.....	6.08	12 34	7 00
*Killbuck	6.02	.....	6.20	12.47*	7 12
*Black Creek	6.18	.....	6.31	12.59*	7 25
Gann	6.33 b 6.53	.....	6.51 b 7.11 b	1.19	7 47
Danville	7 04	.....	7.20	1.29	7 59
Howard	7.18	.....	7.29	1.38	8 10
Gambier	7.22	.....	7.38	1.47	8 20
Mt. Vernon	7.35	.....	7.51	2.00	8 33
*Bangs	7.45	.....	8 01	2.1 *	8.45
*Mt. Liberty	7.53	.....	8.09	2.20*	8 54
Centerburg	8.05	.....	8.18	2.30	9 05
*Condit	8.19	.....	8.32	2.44*	9 19
*Sunbury	8.27	.....	8.40	2.53*	9 28
*Galena	8.32	.....	8.45	2.58*	9 34
Westerville	8.48	.....	9.00	3 15	9 50
Arrive at Columbus	9.15	.....	9.25	3.40	10 20
	A.M		P M.	P.M.	A.M

NORTH-BOUND TRAINS.

STATIONS.	Expr	Mail	Accom	Accom	Sundays only
Arrive at	P M	P.M.	A. M.	A. M.	A.M.
Cleveland	1 45	6.55	10.15	8.30	.....
Hudson	12.35	5.48	8.53	7.15	10.30
Cuyahoga Falls	12.16	5 30	8.33	6.58	10.11
Akron	12.03	5.17	8.20	6.45	9.50
*North Portage	11.46	5.00*	8.03	A. M.	9 34
Clinton	11.30	4 44	7.46	.....	9.18
Warwick	11.25	4 37	7.37	.....	9.12
*Marshallville	11.10	4.27*	7.23	.....	9.00
Orrville	10.57	4.14	7.10 b 6.40 b	.....	8.47
*Apple Creek	10.40	3.56*	6 22	.....	8.27
Fredricksburg	10.26	3.43	6.08	.....	8 13
*Holmesville	10 16	3.33*	5.58	Accom	8.02
Millersburg	10.05	3.22	5.45		7.50
			A. M.	P. M.	P.M.
Millersburg	10 05	3.22	.....	8 35	7.25
*Killbuck	9 51	3.08*	.....	8.23	7.13
*Black Creek	9.39	2.57*	.....	8.11	7.00
Gann	9.17	2.36	.....	7.49	6 38
Danville	9.07	2.27	.....	7.39	6.25
Howard	8.58	2.18	.....	7.29	6.14
Gambier	8.49	2.09	.....	7.14	6 03
Mt. Vernon	8.37	1.57	.....	7.02	5.51
*Bangs	8.22	1.40*	.....	6.46*	5.37
*Mt. Liberty	8.14	1.31*	.....	6.37	5.28
Centerburg	8.05	1.22	.....	6.28	5.17
*Condit	7.51	1.09*	.....	6.14	5.03
*Sunbury	7.42	1.01*	.....	6.06	4.53
*Galena	7.37	12 56*	.....	6.00	4 47
Westerville	7.20	12 40	.....	5.43	4 30
Leave Columbus	6.55	12.15	.....	5.15	4.00
	A. M	P M		P. M.	P.M.

* Stop on signal. B Breakfast. S Supper.

Special Round trip rates will be made for Sunday trains.

The Blue Grass Route of Ohio (Mt. Vernon line) will abandon their regular Sunday trains after September 10th, 1882.

N. MONSARRAT, Gen'l Supt. Akron, O **E. T. AFFLECK,** General Passenger Ag't, Columbus, O.

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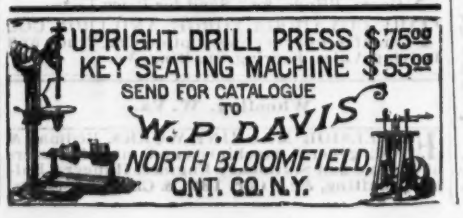
A. J. SMITH, Gen'l Pass. Ag't.



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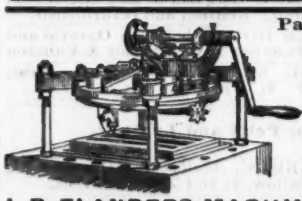

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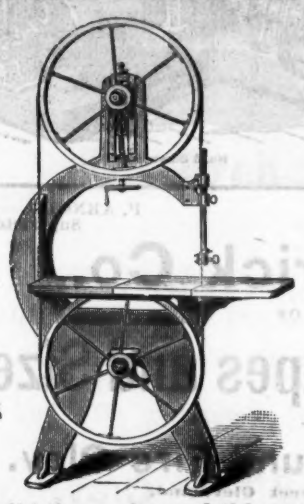

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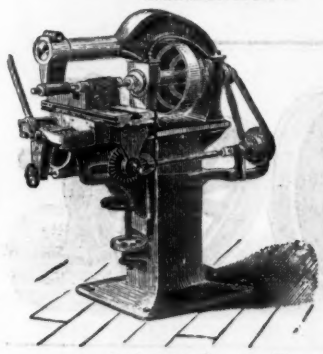

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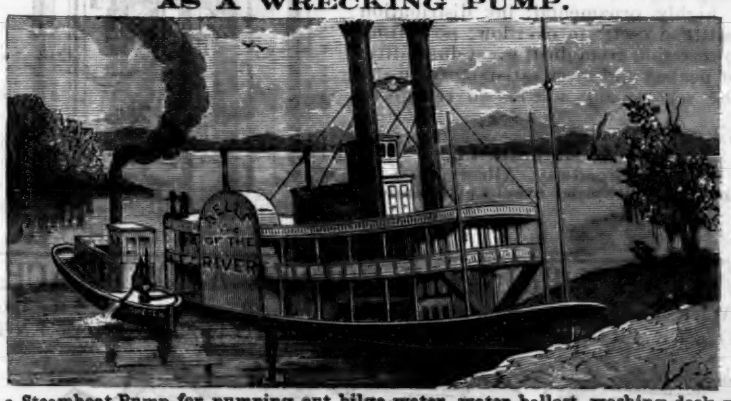

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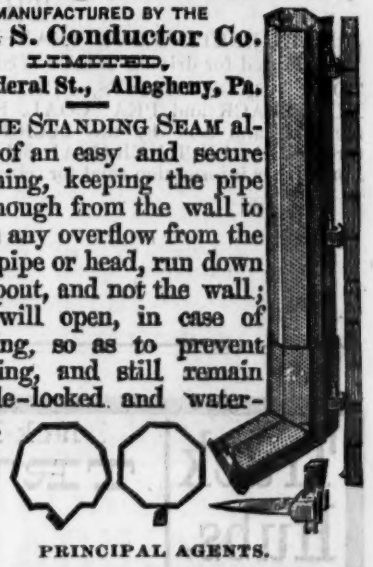

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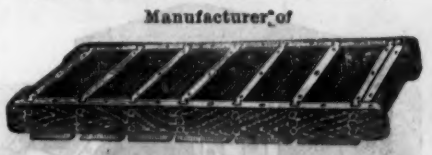

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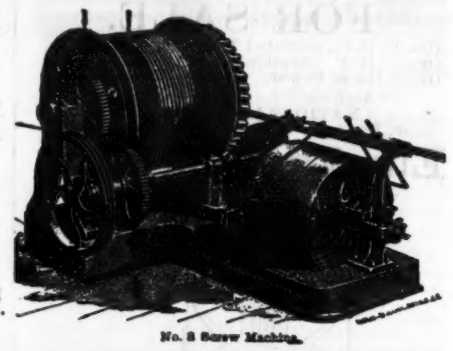
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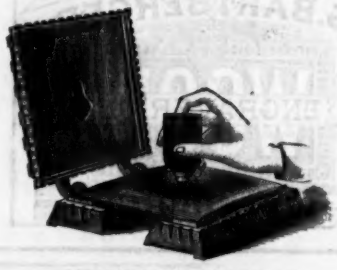

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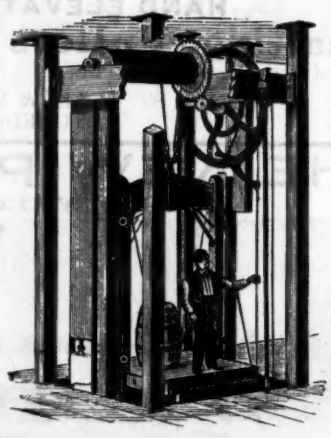

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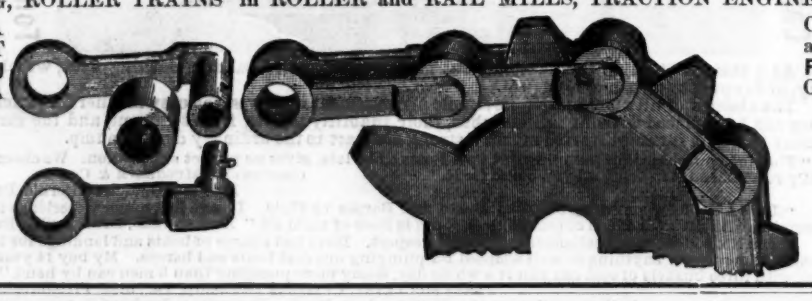

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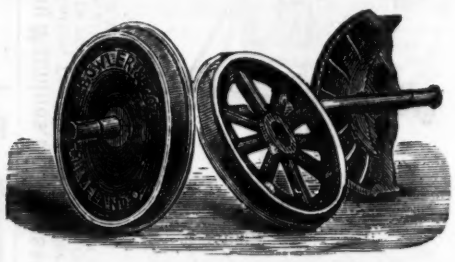

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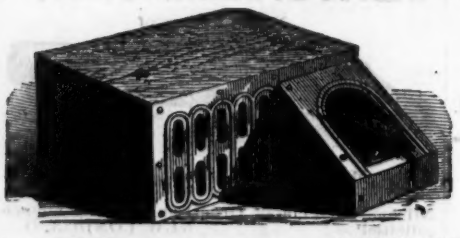
52,932 Mouse Traps Sold in October, 1881.



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"The mouse goes in to get the bait
And shuts the door by his own weight,
And then he jumps right through a hole
And thinks he's out; but bless his soul
He's in a cage, some how or other,
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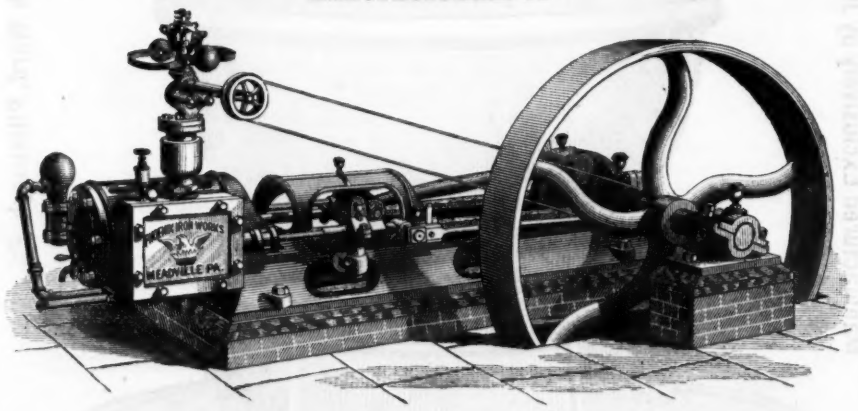

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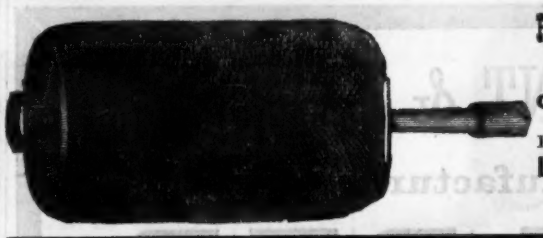

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The above stove, for durability and heating purposes, cannot be surpassed. It also saves coal, from the fact that once heated up it retains the heat for a long time without a fresh supply of fuel. It is particularly adapted for hotels, school-houses, churches, large offices, machine shops, etc.

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